METAL INDUSTRY

ELECTRO-PLATERS REVIEW
BRASS FOUNDER AND FINISHER
COPPER AND BRASS
ALUMINUM WORLD

34th YEAR
January, 1936
Vol. 34, No.

16 John Street
New York, N.Y.

Electroplater's Microscope

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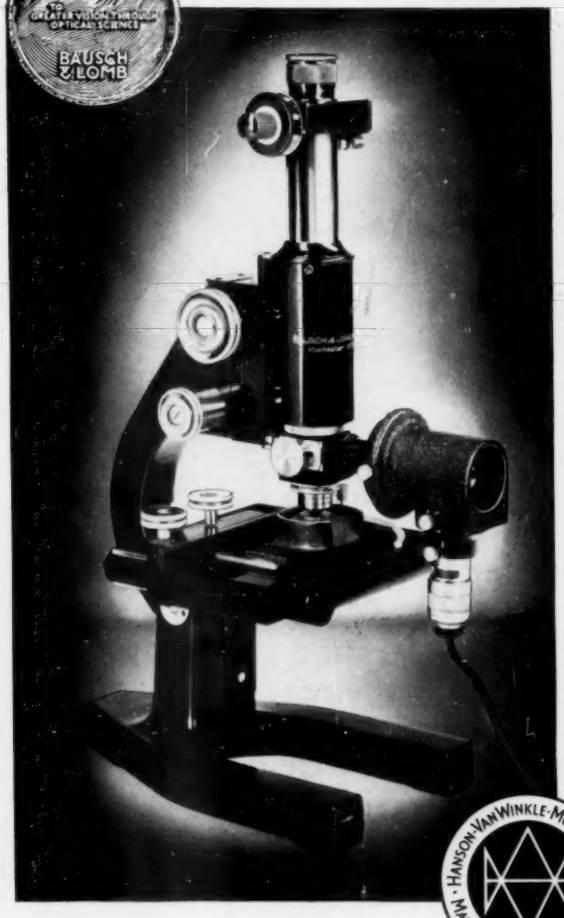

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ANNOUNCEMENT

ZAPON

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January 1, 1936

To Our Customers:

We take pleasure in advising you that effective this date the Atlas Powder Company and its totally owned subsidiaries, The Zapon Company and the Zapon-Brevolite Lacquer Company were combined, and following this date all Zapon and Zapon-Brevolite business will be conducted under the names of "Atlas Powder Company-ZAPON Division" or "Atlas Powder Company-ZAPON-BREVOLITE Division".

Zapon and Zapon-Brevolite Industrial Finishes will, as heretofore, be manufactured at our Stamford and our North Chicago plants respectively, and Zapon and Zapon-Brevolite personnel, sales policies and office locations remain unchanged, assuring the trade of the same high quality materials and service enjoyed for many years past, as well as the same contact with able and practical representatives in the field.

The Managements take this opportunity of acknowledging to you their deep appreciation of the pleasant relations of the past and to express the hope that continued, closest attention to your demands will maintain that relationship as satisfactorily to you, as is desired by us.

Very truly yours,

THE ZAPON COMPANY

General Manager

ZAPON-BREVOLITE LACQUER COMPANY.

General Manager

ATLAS POWDER COMPANY

President

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VOL. 34 NEW YORK, JANUARY, 1936 No. 1

Heads Erect!

THIS issue marks the beginning of the 34th year of **Metal Industry.** Since our first issue appeared in January, 1903, the world has undergone almost unimaginable alterations. It has run the gamut of the most violent extremes: undreamed of developments in science, followed by expansion of industry; the most widespread and most destructive war in human history; a period of inflation, disguised as prosperity, which led to the maddest excesses of speculation; a period of deflation which brought the nation to its knees, with unemployment and grim poverty stalking the land. And now, at last, a few rays of light have broken through the murk.

Our industries have been no exception to the general rule. We have risen high and fallen low. We are now back on our feet. But we are not weak or haggard like a convalescent after a long illness. Rather are we like the galley slave who is released after serving his term—spare and lean perhaps, but stronger and tougher than ever before. The weaklings have died. Those who have survived are the fittest.

The stars are now favorable to those who are prepared to move forward with the new times. But to move forward does not mean to cut all connections with the past. We hold fast to that which is good while we add that which meets our new needs.

Metal Industry will keep abreast of progress. In this issue will be found some new features—the Practical Brass Foundry Digest which will appear regularly; an unusual Symposium on the Year's Progress in the Metal Industries; an extended Review of the Metal Markets. These are our steps forward. Our newly designed front cover and our better paper stock are our new clothes. Our old stand-bys — shop problems, descriptions of new equipment and supplies, reports of activities of associations and societies, personals, news of the industry and metal prices—we hold fast for they are good.

We look forward to a year which seems full of promise for our industries.

FEATURES OF THIS ISSUE

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Practical Brass Foundry Digest—Page.. 23

The Metal Markets in 1935—Page 40

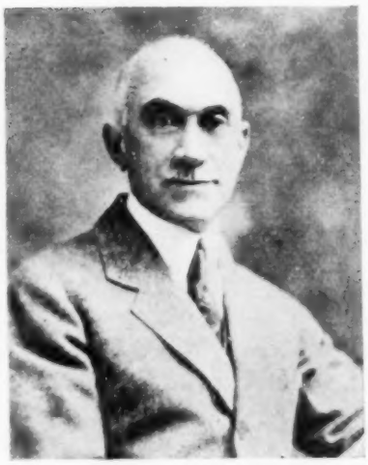
Improvements in the Metal and Plating Industries in 1935

A Symposium on the Technical Advances in the Various Branches of the Non-Ferrous Metal Manufacturing and Metal Coating and Finishing Industries

Ingot Metals

By G. H. CLAMER

President,
The Ajax Metal Company,
Philadelphia, Pa.



THE research work at the Bureau of Standards, sponsored by the Non-Ferrous Ingot Metal Institute, has continued throughout the year. The results of this investigation are not available for publication at present but will no doubt be incorporated in a future paper to be presented before one of the technical societies.

I do not know of any one specific accomplishment within the ingot industry during the past year. I believe, however, that all units of the industry, as they gain in experience, are able to produce ingot metal of greater uniformity and reliability.

The Brass Foundry

By W. J. REARDON

National Alloys Company, Detroit.
Associate Editor,
Metal Industry

IN MY opinion, one of the most important advances of the year is the increased and broadening practice of conditioning molding sands. This movement, I believe, has really only begun. It should go much further, as it will be of great aid to the brass foundry operator.

The Brass Foundry

By H. M. ST. JOHN

Detroit Lubricator Company, Detroit, Mich.
Associate Editor,
Metal Industry

IMPROVED business conditions have not yet been reflected to any great extent in a renewal of development work or technical progress. Improvements in technique, materials and equipment, some of them developed years ago, have not yet been digested and disseminated throughout the industry. The average brass foundry has a good deal of catching up to do.

The American Foundrymen's Association is hopefully planning a new campaign to interest non-ferrous foundrymen in modern methods of molding sand control. Other branches of the foundry industry have benefited largely from the molding sand research sponsored by the A.F.A. and a few brass foundries have demonstrated, to their own satisfaction at least, that the results of this research are applicable to their problems as well.

The publication of the Cast Metals Handbook (A.F.A., Chicago) is an important milestone in the foundryman's journey toward a better understanding and closer co-operation with the designing engineer and purchasing agent, but here again a competent reviewer (John Howe Hall in Mining and Metallurgy, December, 1935, p. 507) feels impelled to say: "It would seem desirable in future editions to expand this section (the non-ferrous) and deal with the non-ferrous metals in the same manner as the excellent presentation of the information on the ferrous metals."

A new development in the Association's work has to do with the systematic diagnosis and cure of de-

fective non-ferrous castings. This work is as yet in a formative stage but it seems to have excited a distinct ripple of interest and, since it necessarily deals with every phase of foundry activity, it may have an ultimate influence in promoting the use of certain improvements in foundry practice which have already been demonstrated as worth while.

The pressure casting of "plastic" brass in steel molds, employing machines of the Polak and Buehler types, has continued to gain ground slowly but surely. For certain types of casting this method has outstanding merit, although its progress is still retarded by the difficulty involved in making wholly satisfactory dies. If the die casters are permitted to monopolize the process, the sand foundryman may find it the most serious competition he has yet encountered, but if the foundryman himself will adopt it as supplementary to his sand-casting operations it may assist him greatly in competing with forged brass and zinc-base die castings.

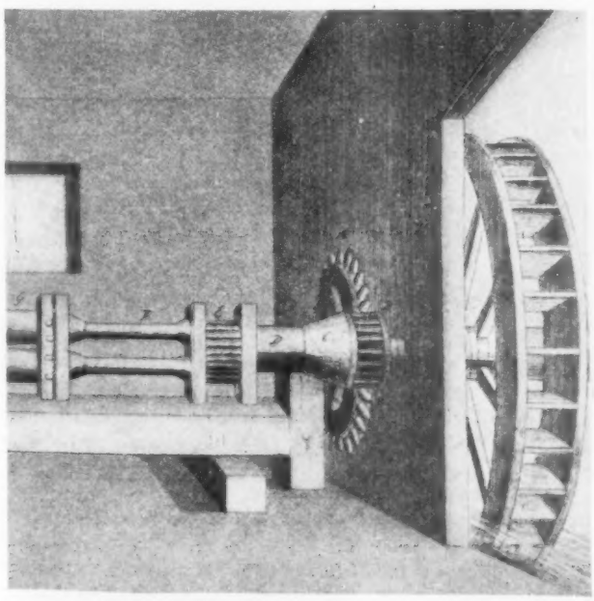
Brass Rolling

By W. J. PETT

Associate Editor, Metal Industry

WE NOTE in the June, 1935 issue of the **Metal Industry,** two patents issued on "Method of and Apparatus for Rolling Brass", and "Rolling Mill". From the industry we have no information of any important change in brass rolling practice, except the normal refinements in equipment, and processing that are a natural growth in every industry.

Had the question been asked "What new methods for producing brass sheets and strips have been evolved since the first brass casting was hammered out by hand?" the answer, perhaps an academic one, would be "Two".



The Earliest Illustration of a Set of Rolls—1734

The first was a set of rolls, described in the year 1734, which displaced the process then in use of beating the brass casting into strips, under a crude form of trip hammer; a distinctly new and more efficient method. The most modern set of rolls today, while a more efficient tool, is still a blood brother fundamentally, to this creation in 1734.

The second new method is still in the experimental stage. The object is to produce a thin sheet of metal directly from the molten bath of the alloy required. These experiments are being made by one of Connecticut's large rolling mills.

Brass Mill Equipment

By W. R. CLARK

Bridgeport Brass Company, Bridgeport, Conn.

SEVERAL types of anti-friction bearings, aside from roller bearings, have been developed and are being put into use on brass mills, among which are molded fabric bearings, manufactured by the leading manufacturers of this type of fabric. These bearings are water lubricated and when properly installed materially cut the friction of the roll-necks and make possible high rolling speeds and a considerable reduction in power. The advantage of these bearings is their low first cost and the fact that they can replace the ordinary brasses in the usual brass rolling mill without further change in design.

One company has developed a precision oil lubricated bearing which can be installed on the average cold rolling mill and will result in low co-efficients of friction approaching that of the roller bearing. The advantage of this bearing is that it can be built on larger roll-necks than is possible when roller bearings are considered. One or two of the brass mills have been equipped with these bearings and are operating successfully. One specification is being successfully met where no oil is permitted to leak from the bearing onto the face of the roll.

We understand that one company has installed a machine for continuously casting a thin wide strip

of sheet brass through rolls, and that this machine is in semi-constant production. As this is still in the development stage, there is very little information concerning it available.

There have been some recent improvements in annealing furnaces for use in the sheet mills. This has been brought about by one company through the further application of a recent development in bright annealing furnaces where the reducing atmosphere inside of a closed retort has been circulated by a fan forcing it past a series of electric resistors through passages which circulate it around the material which is being annealed. The circulation of this gas within the retort has resulted in reducing the annealing time and improving the uniformity in these retort furnaces. Recently a concern in Chicago has applied an extension of this idea to larger furnaces. In this case the combustion takes place in a chamber outside of the furnace. Hot gases are forced by a fan through a series of ducts whose location and size are determined so that very great uniformity of heat application is obtained inside of the annealing chamber. Most of this gas is recirculated and mixed with freshly burned high temperature gas for recirculation. Some of these furnaces are equipped with conveyors arranged to push or pull the work progressively through the furnace from one end to the other. The manufacturer guarantees very close temperature control with these furnaces and controlled circulation of gases cannot help but result in very uniformly annealed material.

Brass Fabrication

By
JOHN L. CHRISTIE

Chief Metallurgist, Bridgeport Brass Company, Bridgeport, Conn.

FOR our own industry, my opinion is that the most important development during the year is the progress made in producing semi-finished wrought metal direct from the molten metal. I refer, of course, to the Eldred and Hazelett processes. Although work on these two processes has been going on for much more than a year, and although as far as I know, neither process is in regular production as yet, I feel that the progress made shows large possibilities for the future.

The Uses of Zinc

By W. M. PIERCE

Chief, Metal Research Division, The New Jersey Zinc Company, Palmerton, Pennsylvania

THE zinc alloy die casting industry continues to present the most striking progress among the many uses of zinc; most significant is the trend toward structural parts. In the past, the decorative uses to which die castings lend themselves so well have somewhat overshadowed the uses where structural properties are the dominant factor. The use of zinc alloy die castings where strength is a major factor has naturally placed a greater premium on good engineering design of such die castings. Satisfactory performance can result only from a combination of good material and design and far too little attention is given even yet to the design factor in the production of die castings.

The large number of automobile radiator grilles which went into production as zinc alloy die castings, during the latter part of the year, are not only interesting in themselves but are of even greater importance in demonstrating the possibilities of very large die castings.

In the field of rolled zinc, there has been an evidently increasing tendency to substitute copper-bearing alloys for those containing the natural hardening element cadmium. The use of copper as a hardening agent in high grade zinc yields rolled metal equal in strength and hardness to the natural cadmium alloy and somewhat superior in fabricating properties.

In the field of zinc coatings, the increasing recognition of the superior properties of zinc coatings for rust prevention, coupled with the moderate cost, has occasioned a sharp increase of interest in zinc coatings both electrodeposited and hot dipped. Considerable activity in the direction of improving both processes of producing zinc coatings has been evident.

The use of zinc for decorative purposes has been materially aided by a general improvement in the quality of electroplated coatings, usually nickel-chromium, as applied to zinc. The work of the American Electro-Platers' Society on the subject of the life of electroplated coatings on non-ferrous materials should prove of further benefit in this direction.

The use of metallic zinc paint as a rust inhibiting priming paint received greater attention during the past year. With industry painting up, the ability of this paint to expand and contract at different temperatures—thereby lengthening its life of efficiency—is proving very interesting for the protection of steel and iron. As the paint most adherent to galvanized iron and zinc surfaces it has already, of course, won a considerable measure of recognition.

Developments in Tin

By D. J. MACNAUGHTAN

Director of Research, International Tin Research and Development Council, London England.

DURING 1935 a considerable amount of information concerning tin has been published as a result of the researches of the International Tin Research and Development Council.

The main outlet for tin continues to be in the form of tinplate. During 1935 this industry has received considerable impetus through the canning of beer. It has been found that the porosity of hot-tinned coatings can be reduced or eliminated by a superimposed flash of electrodeposited tin.

Electrodeposited tin coatings of any desired thickness can now be produced, while methods have been evolved for applying hardened tin coatings by simultaneous deposition of another metal, such as nickel. The electrodeposition of non-porous bronze coatings has been perfected; such coatings form a suitable underlayer for a chromium finish.

The possibility of markedly improving tin-base alloys has been established. An interesting feature of these researches is the discovery of the beneficial effects of heat treatment in certain high-tin alloys.

Improvements in the working properties of bronzes, containing 6-12 per cent of tin, have been effected by a new treatment that converts the structure of the alloy almost completely into the α-phase.

Lead

By F. E. WORMSER

Secretary, Lead Industries Association, New York.

ALTHOUGH no technical developments in the use of lead occurred in 1935, known to the writer, which at present appear likely to be epoch making, the year was not without its scattered contributions to improvements in the art of using lead. Thus, a continuous lead extrusion machine, invented and perfected in England during the past five years, operating on a screw principle rather than as an hydraulic press, is being introduced in the United States to extrude continuous lengths of lead-sheathed cable. In this machine the lead surrounds a specially designed screw thread and is forced through the die by rotation of the screw.

Research work has been done on the advantage of calcium-lead (0.1% calcium, 99.9% lead) as a grid metal for storage batteries. Results indicate principally that batteries with calcium lead grids have a lower rate of self-discharge than those constructed of antimonial lead.

Evidence is growing that the excellent properties of lead as a sound deadening material are being better appreciated.

Sheet lead is also finding growing favor as a roofing and flashing metal. The cost of hard lead roofing has been drastically reduced so that its wider application as a sheet metal is expected in building construction. Sheet lead is being used to cap wooden piles in ferry slips to prevent rotting of the piles.

In the alloy field it is worth noting that the use of a ternary alloy of lead, (.15% cadmium, .4% tin, or lead with .25% cadmium and .5% antimony) is being tried out as a cable sheathing metal. The tendency among utility companies to use as thin a lead sheath as possible makes it attractive. Interest continues to grow in the use of electrical cable for heating hot beds and for melting snow and ice on sidewalks.

Diesel engines in modern high speed transcontinental and streamline trains are using bearing alloy linings composed of a lead alloy containing small amounts of tin and calcium.

A patented shatterable bullet has been manufactured of zinc and lead particles pressed together. The bullet is said to shatter when it strikes a target and will not ricochet.

In the lead pigment field, a new addition to the impressive list of available paint pigments has been marketed, i.e., lead tin titanate. It is reported that a reclamation plant is being erected at Goose Creek, Texas, for the purpose of recovering the spent litharge used for oil refining. This is said to be the first plant of its kind in the United States.

Lead and Tin

By G. O. HIERS for DR. G. W. THOMPSON

Chief Chemist, National Lead Company, Brooklyn, N. Y.

DR. G. W. THOMPSON

SEVERAL new bearing metal alloys have attracted attention in the automotive field. The pre-eminent position of standard tin base bearing metals has been challenged by the use of copper-lead alloys and cadmium base metals for automobile

engine bearings. Lead alloys containing a few per cent of several elements including calcium and tin are being used in the Diesel engines which drive some of the new high speed trains.

A lead alloy containing 0.1 per cent calcium, balance lead, has excited interest for use in storage battery grids instead of antimonial lead. This metal is said to prevent a large part of the self-discharge which takes place while the battery is idle and also to provide better electrical conductivity.

A recent investigation by C. W. Mason and W. D. Forgeng seems to indicate that the addition of 0.0035 per cent bismuth inhibits the transformation of ordinary tin to gray tin, a phenomenon known as the "tin disease" or the "tin pest," which causes the pure metal to turn into powder at low temperatures.

A wider use for tin is indicated in the growing use of tin cans for beer containers. Some manufacturers of collapsible tubes are now using a three ply metal made of a lead alloy faced with tin on both sides.

Aluminum

By S. K. COLBY

Vice-President, Aluminum Company of America, Pittsburgh, Pa.

THE year 1935 saw a more diversified use of aluminum, in addition to modest increases in tonnage in the fields where it already occupies an important place. The year marked the establishment of new aluminum works in Scotland, Russia, Japan, Germany and Italy. This would indicate that the record for 1927-32 in which North America made over half the world's production, will not again be achieved.

Transportation continues to provide the largest single market. Railroad activities in streamline trains are still of major interest. In aircraft, the China Clipper, built chiefly of aluminum, was the outstanding achievement of 1935. During the year there has been a rapidly increasing use of aluminum alloy pistons in motor vehicle engines, Oldsmobile being the latest General Motors' car to adopt Lynite T-Slot designed pistons of the Lo-Ex alloy.

The truck and bus field, where light strong aluminum alloys yield dividends in the payload carried through weight saving, showed a substantially increased use of the metal during the past year. Saving in weight also proved the deciding factor in favor of aluminum in contractors' equipment, the most striking development being a 32 cu. yd. bucket for a shovel dipper. Of possible historic interest in marine transportation was the launching in December of an all-aluminum test ship-section at Bath, Maine. Designed by a noted naval architect, this construction will be studied for the action of the elements and stability factors. Here again weight saving is an important feature.

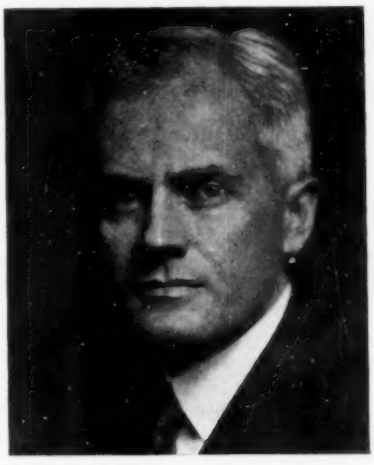
Research and technological advance, always active during periods of depression, have made possible the placing of two new types of aluminum alloys on the American market during the past year. One type consists of free cutting alloys developed principally with a view to utilization in screw machine stock. The other alloy was developed primarily for production of die cast burner heads for domestic gas ranges.

Increasingly large single units of fabricated aluminum were produced during the year. The trade is beginning to make good use of these advances in the art by utilizing heat-treated forgings weighing as much as 1,350 lbs., heat-treated castings of 3,500 lbs., and single heat-treated rolled plates and beams with weights up to 2,400 lbs.

Nickel

By
Dr. P. D. MERICA

Assistant to the President, International Nickel Company, New York



ALTHOUGH the complete figures are not yet available, it seems certain from those of the first ten months (about 133,000,000 pounds) that the world consumption of nickel in 1935 exceeded that for 1934 and indeed for any preceding year, and reached an all time high. This encouraging development may be fairly taken as reflecting the growing utilization of nickel in substantially all of the diversified products, alloy steel, alloy iron and non-ferrous metals, into which nickel enters as well as by all of the industries using these products.

In the field of non-ferrous metals, the electroplating industries and the non-ferrous foundries, both for copper and for aluminum-base castings, required substantially increased amounts of nickel, and nickel was much more freely used as well in the form of rolled malleable nickel and Monel Metal. It is interesting to record the introduction of several new nickel alloys into the repertory of non-ferrous mills and foundries. Improvement in the manufacture of "K-Monel" Metal, or aluminum Monel Metal, progressed to the point that this alloy was announced to the trade by The International Nickel Company, Inc., early in the year. Carrying about 3% of aluminum, this alloy is hardenable by appropriate heat-treatment and through such treatment quite interesting mechanical properties may be developed, including values of tensile strength and proportional limit of 125,000-175,000 psi and 75,000-125,000 psi respectively, associated with substantial ductility as evidenced by elongation and reduction of area values of 15-25% and 30-40%, respectively. The alloy thus presents a rather unusual combination of

high mechanical properties and resistance to corrosion and is beginning to be used for a variety of special purposes where precisely such a combination of properties is required. An outstanding example of the application of K-Monel Metal is its use in the form of forged stems for the water gates on one of the United States Government dam projects in West Virginia. These stems were about seven inches in diameter and about eighteen feet long and the tensile strength attained was 140,000 psi.

The electroplating art has been enriched recently through improvement in the processes for the bright plating of nickel. Bright nickel plating has of course been practiced for years, and the general conditions for its production have been fairly well established. Recent progress in bright plating technique, however, has brought improvement in the character of the bright deposits produced, particularly in their ductility and adherence, such that it has become possible to produce thick, bright deposits commercially. Obvious economies are possible in consequence of the adoption of these modern bright plating processes, particularly in connection with the labor cost of buffing. It is claimed that the initial buffing operation currently practiced in the conventional sequence may be substantially reduced in extent and cost and the final buffing treatment prior to chromium-plating entirely eliminated. The automotive industry as one of the chief users of nickel-plating is much interested in these new developments.

Periods of depression are, strangely enough, apt to have a pronounced stimulating effect upon invention and development in all active industries which are seeking better products, new markets and lower costs. It would appear that the metallurgical industries, however strongly they have felt the incidence of the depression, have also experienced its beneficial effect and nickel has been in position to share generously in the results of this metallurgical revival.

Beryllium Developments

By L. L. STOTT

Sales Manager, Beryllium Products Corporation, New York

INCREASED interest in the use of temperable beryllium alloys has resulted in the steady expansion of the domestic production of beryllium over the past year. Although to the general public the metal is still comparatively unknown, the properties imparted to copper and nickel by small additions of beryllium are quite revolutionary in their industrial significance.

A 2% beryllium content in copper will make an alloy which can be heat treated to six times the strength of soft copper and will attain the hardness of spring steel. In the soft annealed state a wire or strip of beryllium-copper can be wrapped continuously around the finger, and yet the same alloy hardened by heat treatment alone can be made into a chisel which will cut steel. This combination of easy cold formability with the possibility of hardening to Rockwell C 41-42 or 365 Brinell by a simple furnace treatment is unique in metallurgy.

One interesting development over the past year has been the application of cast beryllium-copper to molds for the manufacture of plastics. The expense of steel dies, particularly for sample pieces, short runs, or articles requiring considerable ornamental detail, has often been prohibitive in this field. It has been found that where very close tolerances are not required, molds can be cast to shape in beryllium-copper with a satisfactory surface, and having sufficient strength to stand any pressures used in the plastic industry, thus obtaining in some cases, very considerable savings in expense.

The same procedure has also been used with success for metal forming dies. One manufacturer of silverware has, by the use of cast beryllium-copper containing 2¾% beryllium, made interesting savings in getting out sample pieces for display purposes. After use the dies can be melted up and reclaimed.

Beryllium-copper has proved an interesting material for severe bearing and worn gear problems. Having a wear resistance many times that of conventional tin bronzes, and unusually high compressive strength, the alloy has handled services in these fields where all other alloys failed.

Beryllium as the element itself is not available commercially, it having proved more economical to manufacture alloys directly without going through the pure metal stage. Master alloys of beryllium are sold at $30 per pound of contained beryllium, with the base metal at market. Finished beryllium-copper alloys containing approximately 2¼% beryllium, as sold by leading copper fabricators, sell in the neighborhood of $1.00 per pound.

Jewelry Manufacture

By C. M. HOKE

Consulting Chemist, The Jewelers Technical Advice Company, New York City

JEWELRY making was among the first industries to feel the depression, and among the last to speed up again. For this recovery to be well under way is the big achievement of the past season.

True, actual manufacture is still below normal; there were too many articles in stock left over from other years; but retail sales are clearing these out and the long-quiet factories are coming to life again.

Technical improvements are mostly processes that were worked out in previous years, and are now becoming common. Among the first of these to come to mind are rhodium plating, the Bek process of gold plating, anodic coloring of aluminum, and other developments in electroplating.

The return of yellow gold to popularity is complete, though of course platinum is still esteemed in high grade diamond work, etc. Indeed, color in jewelry and novelties is the keynote—colored stones, colored metals, the new colored synthetic plastics—even col-

ored mirrors—combine to make the shop windows a very bouquet of flower-like splendor.

A glance through the pages of the trade journals shows that clocks and watches—including electric clocks, are still the most active branches of the industry. Watches appear in unexpected forms, on bags, bill-clips, lipsticks, etc., and clocks appear in new dresses and with bizarre faces. The use of mirrors is conspicuous in gift-shop goods. May they reflect a gay Holiday Season and flash its brilliance down the wakening New Year—which we hope will be a "Perfect '36!"

Brass Machining

By W. B. FRANCIS

Associate Editor, Metal Industry

THOSE, if any, who may know the status of the brass business of 1935 as compared with that of 1934 have not yet announced the red and the black of it. Therefore, our prognostigations, like those of the weather man, might be stated as "variable winds and not much change in temperature." Wars and rumors of wars have kept up a demand for sheet brass, and may have increased it. Then, again, the brass-shell game has had big increases in the enlarged police forces used to protect us from the criminals at home, and from the raiders from without our bounds. Furthermore, the collections of certain enormous government revenues must be almost literally shot out.

The use of brass die castings has probably increased owing to the available improved metals more suitable for the dies. Brass castings in permanent molds and in sand molds for plated goods, such as for plumbing supplies, refrigerators, automobiles, and aircraft, etc., have held their field, but the competition from die castings made from other materials than brass has been increasing very rapidly. Enormous output of squirted or pressure castings is made of these materials, which are cheaper, lighter, more decorative, and require less subsequent machining operations than brass. Brass forgings are filling a special demand in the jewelry, cutlery and ornamental fields. Low-priced silver, before the present abnormal price owing to the ignoring by law of the "law of supply and demand", did not cut in on the use of brass appreciably.

Brass spinning for the electrical and house furnishing industries may still hold the field against any other metals for these purposes. Extruded structural shapes of solid brass are cut up and shaped into scores of articles by automatic machines. There is an increased use of bronze rods for braze welding of cast iron and steels.

Improved rolling and annealing processes have stepped up the rate of sheet brass production, and at the same time gained a more uniform quality and gauge, so that the trade gets better brass and has less wastage. Electric melting is the standard for the super-grade alloys. Cupola melting of large tonnages is claimed practical for brasses, especially for that large class of uses not requiring the super refined metals.

The improvements in machining brass, aside from the spinning and press forging processes, are mainly from the use of the carbide cutting tools. Cutting speeds on brass have been multiplied about eight times, it is claimed by the manufacturers of some of the carbides.

Advances in Electroplating

By DR. W. BLUM

National Bureau of Standards, Washington, D. C.

IT IS difficult to select a particular advance in electroplating as the "most important" development of the year, especially since several of the activities have been closely related. Among those that warrant consideration are (1) the formal adoption of specifications for electroplating; (2) the development of new methods for testing deposits; (3) the increased use of bright zinc plating.

The American Electro-Platers' Society, the American Society for Testing Materials and the Master Electro-Platers' Institute adopted tentative specifications for nickel, chromium, zinc, and cadmium coatings on steel. The latter organization also adopted specifications for plating on brass and die-castings. (Researches on the latter are in progress at the National Bureau of Standards in cooperation with the first two societies). The wide-spread use of these specifications will no doubt lead to greater standardization, and to an improvement in the general quality of plating.

The successful application of such specifications demands simple, reliable methods of testing the deposits. Hull and Strausser improved Clark's dropping method for cadmium and extended it to zinc coatings[1]. Mesle described his new "chord" method, which appears to be applicable to a wide variety of plated coatings[2]. Both of these methods warrant a thorough trial.

The use of cadmium in bearing metals has caused it to be scarce and high in price and has hampered its application in electroplating. This situation has stimulated researches on zinc plating, which have contributed to the commercial deposition of bright zinc coatings at high current densities. One is reminded of the fact that, nearly twenty years ago, methods for rapid cobalt deposition were published. As, however, the price of cobalt remained high, the chief commercial effect of the studies on cobalt plating was to stimulate researches that resulted in more rapid nickel deposition.

Back of these and other recent developments is the increased interest of manufacturers and chemists in electroplating, and their realization that real progress in this field can best be accomplished by cooperation with the electroplaters, through such progressive organizations as the American Electro-Platers' Society.

[1] See **Metal Industry** for April, 1935, p. 133-4.
[2] See **Metal Industry** for August, 1935, p. 283-289.

Electrometallurgy

By
DR. COLIN G. FINK

Columbia University,
New York

THERE have been a number of important achievements in electrometallurgy, worth while recording. The Bell Telephone Laboratories discovered that the performance of lead storage batteries is very markedly improved by substituting an alloy of lead and calcium for the present alloy of lead and antimony. The consumption of calcium has increased very markedly in other fields and is no longer looked upon as a laboratory product.

The year 1935 marks the introduction into industry of the writer's aluminum plating process—aluminum on steel and other metals. The manifold uses of the new product comprise building parts, airplane parts, automobile parts, electric furnace parts, etc. There are three inherent properties of the product which give it its superiority over any other similar type plate—such as tin-plate, terne plate, and hot galvanized plate on the market today. Aluminum plate has not only inherited the high corrosion resistance of pure aluminum, augmented by the acid resistance of aluminum-iron alloy, which forms the bond, but also it has the valuable mechanical properties of steel. Finally, a combination of the two metals has resulted in a third valuable property—namely, resistance to high temperature. The product is the only plate which is both rust-proof, and fire-proof. Hundreds of feet of ribbon made by this process have been used as resistor, for electric furnaces.

In the plating field, the one development which is going to affect plating more and more in years to come, is the introduction of strip metals—notably steel and copper. A dozen new strip mills are under construction throughout the world and this new phase of the steel industry introduces new methods and means for coating strip continuously. In the end, there will be the elimination of the handling of numerous small articles after spinning, whereas the present plans are to do all the drawing and spinning after the plating. A little thought as to what the strip metal will do to the plating industry will lead one to the ultimate conclusion that the plating industry will be more prosperous than ever, because it will be able to compete with products of other fields, where competition is impossible today. Thus, we may expect plated articles to displace some of the plastic articles that have found their way into the market today.

To sum up, if we wish to put our finger on the one outstanding development in metallurgy during 1935, it is the introduction of strip metal, and this in turn is going to revolutionize the coating of metals, whether this be by electrodeposition or by hot dip processes.

Electro-Plating

By DR.
A. KENNETH
GRAHAM

University of Pennsylvania, Philadelphia, Pa.

THE announcement of the development of unit polar generators for electroplating in January of last year has been followed by a most interesting development of this type of machine, which promises to change radically the design of low voltage generators. Not only are the operating characteristics of these machines superior to the conventional type, but it has been possible to construct single six-volt machines with as high as 40,000 ampere capacity.

The tendency to apply continuous pickling and plating to wire is being extended to strip stock. While this application pertains chiefly to electro-galvanizing, it is entirely possible that the development may include a number of other metals.

During the past year tentative specifications have finally been prepared and adopted for a number of plated coatings. Manufacturers are finding it necessary to modernize their plating departments in order to meet these specifications. In so doing, the plant executive is learning to appreciate the need for accurate scientific control of all the variables involved. A marked improvement in the quality of plated finishes is resulting.

Bright nickel plating has proven itself to be economical and practical. A number of processes are already successfully operating. Considerable improvement in quality and ductility has already been attained and further developments of this nature are anticipated.

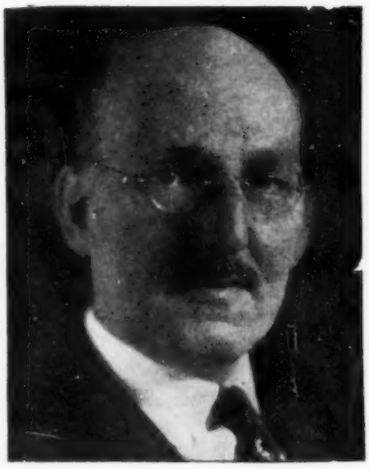
The increasing demand for cadmium in other than electro-plating applications has resulted in a very widespread change to zinc coatings. The need of duplicating the brightness and non-staining properties of cadmium has been met to a surprising degree by the several bright zinc processes which have been introduced within the past year. As with all new developments, improvements are bound to result and it is expected that regardless of any change in the cadmium situation, bright zinc finishes will permanently offer a challenge to cadmium.

While each year presents its new developments, marking the progress with time, it is interesting to compare plating practice today with that of a few years ago. Aside from new plating processes, the whole industry has assumed a scientific control that is most striking. The only unfortunate phase of this situation applies to the few individuals who are failing to equip themselves to conduct plating operations according to the improved methods that are demanded. Fortunately, this group represents a very small minority from whom converts are daily being won.

Electroplating

By GEORGE B. HOGABOOM

Hanson-Van Winkle-Munning Company, Matawan, N. J.



THAT electroplating is progressing and is not in danger of being relegated to the rear as a lost art is evidenced by two outstanding accomplishments of 1935.

First. The formulation of standards for specifications for electroplated coatings.

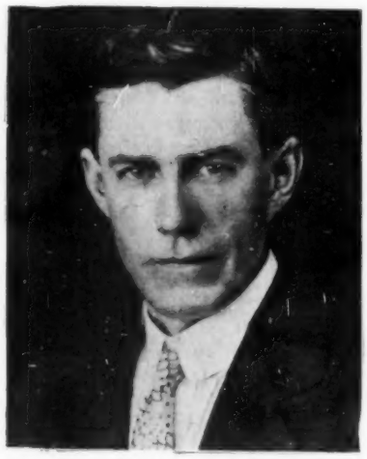
Second. The almost unbelievable progress made in the employment of high current densities in electroplating solutions. Zinc is being deposited at 1000 amperes per sq. ft.; Copper at 800 amperes; Nickel at 400 amperes; Iron at 600 amperes!!

No better evidence is needed that electroplating is being firmly established as a science.

Electroplating

By OLIVER J. SIZELOVE

Plater-Chemist, Irvington, N. J.



I WOULD consider the deposition of bright zinc plating the most important development in the electroplating industry for the year, 1935.

Due to the limited quantity of cadmium that is available for the plating industry it was necessary in many instances to revert to zinc plating as a protection of the ferrous metals for corrosion resistance. Before cadmium plating was used commercially, zinc plating was used almost entirely for corrosion resistance purpose, due to the high cost of cadmium. As the production of cadmium increased the price was reduced and cadmium plating could be used commercially.

The color of the zinc deposit from alkaline zinc solutions is not very pleasing and it also has a tendency to tarnish more rapidly than deposits of cadmium. To overcome the tarnishing properties and also to produce a deposit that more closely resembles cadmium deposits, bright zinc deposits are being produced.

Silver Plating

By F. C. MESLE

Oneida, Ltd., Oneida, N. Y.

I KNOW of no radical change that has been made in silver plating practice, either in type of solutions used or in the manner of using them.

The double silver cyanide solution continues to be used as the most practical type of solution for silver plating. The chief objection to this solution is the fact that it is extremely poisonous. I think, however, that 1935 has made a real contribution in this direction in the studies made by **C. W. Fleetwood** and **L. F. Yntema** who are connected with the University of St. Louis. These studies indicate that a Sodium iodide citrate bath gives promise of being a satisfactory substitute. These studies are reported in: "Industrial and Engineering Chemistry" for March, 1935.

The growing demand for plating to specifications applies to silver as well as other metals, and the work done by Dr. C. F. B. Young and S. C. Taormina, published in the **Metal Industry** for May of this year is most commendable. I think this is a very useful contribution to the advancement of silver plating process, as also is the work of Thomas A. Wright of Lucius Pitkin, Inc., who pointed out the need for more adequate specifications in his paper "A Survey of Testing in the Precious Alloy Field."

The Jobbing Electroplating Industry

By MAXWELL M. WISE

President, Master Electro-Platers' Institute of the United States, Detroit, Mich.

WHEN the Master Electro-Platers' Institute was organized over two years ago it was brought into being by a small group of job shop owners who realized the vital necessity of coordinating the efforts of the members of a sadly disorganized industry, due to certain bad practices and conditions which, while not inherent, were apparently accepted as such.

Speaking for the many faithful members who have

kept their shoulders to the Institute wheel during the past year, I can say without fear of contradiction, that the most important improvement in our Industry during the year is the astonishing extent to which our members have become "quality conscious".

The Institute has emphasized constantly the necessity for improvement and the members have responded in surprising numbers by purchasing microscopes, engaging chemists or making connections with established laboratories, and in other ways indicating that they have come to realize that **Quality Pays.**

Electroplating in Great Britain

By S. WERNICK

Consulting Electro-Metallurgist

London, England

THERE has been no outstanding achievement in electrodeposition in Great Britain during the past year but it has been a progressive one, both industrially and from the research point of view.

The introduction of standard specifications for plating is by no means an accomplished fact in this country, where the spur of the industrial codes experienced in the United States has not been felt, but the day when such specifications will be in operation, has been brought nearer by events during the past year. Such specifications are being actively explored now and they will probably follow the type of specifications recently set up by the Bureau of Standards. It is felt, however, that such specifications should include a rapid, but accurate method of testing deposit thickness—not merely of the "anodic" deposits (i. e. zinc and cadmium) but also the "cathodic" deposits, nickel and chromium.

The most significant advance is perhaps in the field of alloy deposition, which opens up enormous possibilities, some of which may prove highly important commercially. The electrodeposition of zinc-cadmium alloys, for example, is of practical importance at a time when the price of cadmium has risen almost to the point where it is uneconomic as a plating, particularly when zinc is so cheap in comparison. The electrodeposition of bronze upon which interest has been recently focussed, opens up the possibility of bronze as an undercoating for chromium.

The future should see big developments in alloy deposition and it is perhaps not entirely imaginative to envisage the time when not only will it be possible to deposit almost any required alloy with two, three or more constituents, but by adjusting the anode current density and other electrolytic conditions, to plate an alloy exactly to specification!

One further noteworthy development which has been an important feature of the past year has been the increasing use of rectifiers as the source of current in the plating shop. They are gradually replacing motor-generators of all sizes, the biggest installation having exceeded 10 000 amperes.

Secondary Metals

By THOMAS A. WRIGHT

Technical Director,
Lucius Pitkin, Inc.,
New York

LITTLE, if any, developments of an outstanding nature have occurred in the year 1935. With no figures available it is reasonable to predict that the tonnage in secondary copper has increased over the preceding year due to increased production of scrap.

Sweating of radiators by the use of steam seems to have been found a commercial proposition and one of the most recent furnaces is electrically heated.

There appears to be a tendency to use less solder on the newer radiator production, which will call for greater economies in the recovery operation. In this connection a paper will be presented in February at the A.I.M.E., on the production of solder electrolytically.

Due to the low price of copper, foundry skimmings and other low grade material carrying less than 18-20% copper, depending upon the freight rate and distance, are a drug on the market.

The tonnage of secondary lead covered cable, whether of the power or telephone variety, is still adversely affected by the utility and general situation.

There has been little change in the situation in reference to lead and tin drosses of metallurgical character and the same is true of that having its origin in the textile and chemical plants.

Nickel scrap offers a peculiar situation in that bids for skeleton scrap and clean clippings for export may be several cents per pound higher than the market price in this country for new material. The demand from abroad, no doubt due to the war situation, continues strong for both radio scrap and electroplaters' scrap as well.

Of very small tonnage, but of interest as being new, is the production of cadmium-nickel and silver-cadmium secondaries arising out of the marked increase in the use of the cadmium bearing alloys. They offer new problems of economical recovery.

Precious metal scrap, of course, has moved swiftly and is in great demand due to the gold and silver economic situation. Many of the sweeps carry rhodium today but in non-paying quantities, its origin being the prevalent use as a flash or coating for white gold alloys. Gold-clad, silver-clad and gold-palladium-clad alloys are beginning to be pushed for use in industrial as well as in dental fields, but their effect on the secondary market is to come.

The year 1935 then is more of interest for the developments which have occurred in the way of new and improved products, whose effect will only be felt in time to come, rather than for any previous technical or economic factors whose effect on the secondary metal situation occurred, increased or decreased, in 1935.

Electric Annealing of Brass and Copper

By T. B. BECHTEL
Engineer, The Electric Furnace Company, Salem, Ohio.

Uniformity is a Primary Requisite. Successful Methods of Bright Annealing Spooled Copper Wire in Continuous Electric Furnaces

Coiled Brass Annealed in Return Recuperative-Type Electric Furnace

Coiled brass strip is annealed in a double-chamber, return recuperative type, electric furnace in the Cleveland plant of the Chase Brass & Copper Company.

The furnace consists of two units inclosed in a single shell. Its overall length is approximately 40 ft. and its overall width is approximately 19 ft. The connected load is 240 Kw., 120 Kw. in each unit. Each furnace unit consists of a heating chamber approximately 10½ ft. long and a recuperative chamber 20½ ft. long. Each chamber is 7 ft. wide, accommodating two charging trays across the width.

An electric hoist loads the coils on heat-resisting steel trays on transfer cars, which are moved to the front of the furnace, and the work is charged into the furnace on the trays. The tray travels through the recuperative zone, then through the heating zone and across the back end of the chamber, and returns through a soaking section of the heating chamber and through the recuperative chamber on the opposite side of the furnace. When in the recuperative chamber, on its return to the discharge end, considerable of the heat from the annealed coils is absorbed by the incoming cold coils in the opposite chamber. The coils are moved at regular intervals through the furnace and across from one side to the other by motor-driven pushers automatically controlled, all movements being synchronized and interlocked.

The furnace has three zones of automatic temperature control. The first is in the recuperative chamber, through which the incoming work passes. The second is in the heating chamber and transfer section at the back of the furnace, and the third is in the soaking section of the heating chamber through which the outgoing work passes. The heating elements are heavy cast heat-resisting alloy grids, located in the furnace roof and in the bottom of each heating chamber.

The furnace has a rated production of 6,000 lbs. per hr. in the two units. The operating temperature varies from 775 to 1250° F. The average time cycle for the complete annealing operation is about 4 hrs. 15 min., the rather long cycle affording maximum time for recuperation. Tests have shown that work annealed at about 1050° leaves the furnace at between 500 and 600°, indicating the amount of heat that has been released to the incoming cold charge. Tests, it is stated, also show a remarkable uniformity attained.

The furnace shell is gas tight, so that the furnace may also be utilized for bright annealing copper in a protective atmosphere.

The equipment was designed and built by The Electric Furnace Company, Salem, Ohio.

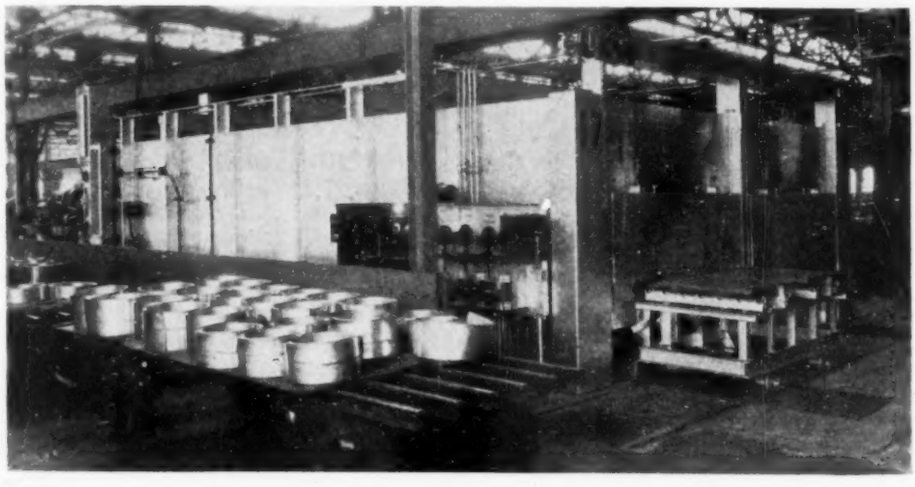


Fig. 1. Double Chamber Return Recuperative Type Electric Furnace for Coiled Brass

Bright Annealing of Fine Copper Wire in the Continuous Furnace

It is axiomatic that the most important characteristic of wire is uniformity. In the production of fine copper wire, and in view of the requirements of the subsequent fabricating processes, the necessity for uniformity is particularly stressed. Naturally the annealing operation is a very important contributing factor either for or against a uniform product, according to whether the annealing practice is good or bad, and therefore, annealing equipment capable of turning out a uniformly annealed product is a matter of foremost importance for the wire mill.

Applicability of Continuous Furnace to the Annealing of Fine Copper Wire

It is also a commonly accepted fact that the continuous furnace is inherently best adapted for the maximum uniformity of temperature distribution in all heat treating operations. Other considerations, such as the nature of the product, wide variations in materials, time cycles and temperature requirements and variations in production may be strong influencing factors in determining whether it is advisable that the heat treating equipment be of the continuous type or of the batch type, and each product and the production requirements of each mill constitute separate problems for every case in order that mistakes be not made in the recommendations for, and the installation of the proper furnace equipment.

Adaptability of Fine Copper Wire and Annealing in the Continuous Furnace

In the annealing of fine copper wire, spooled, it is quite apparent that the nature of the product is such as to lend itself very readily to handling in the continuous furnace. The spools of wire form a dense and compact load, as concerns the individual pieces comprising the charge, so that the loading and unloading of the conveyor are simple and quickly accomplished, and the shape and size of the spools are such that they may be very conveniently handled on an extremely simple form of conveyor.

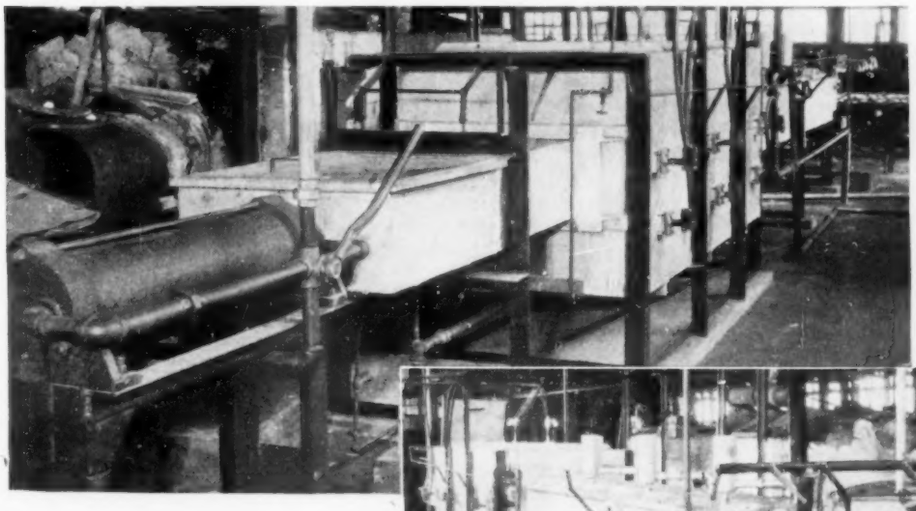
Advantages of Continuous Furnace for this Product

From the above, it is apparent that with this product we have a case where the use of the continuous furnace is strongly indicated, and the benefits of continuous heat treatment be utilized. In general, these benefits are:

1. Improved quality of the anneal.
2. Reduced time in process.
3. Continuous flow of product.
4. Simple and economical handling.
5. Speeding up of shipments.
6. Decreased material in process.

Quality of Anneal in Continuous Furnace

Regarding quality of the anneal, it can be seen that loading the spools one layer high, with uniform distribution of the heat source both above and below the load, the conditions are decidedly more favorable to uniform heating of the individual spools than is the case where a number of spools are built up into a comparatively high and broad stack. In such stack, under ordinary conditions, it is obvious that the outer layers of spools are the first to reach temperature, with the center spools the last. Conversely, on cooling, the outer spools are the first to cool off, and the center spools the last. Thus, there is considerable difference in the time temperature curves of the several parts of the stack of spools, and to overcome this, either the time cycles are excessively long, to approach equalization, or devices such as forced convection are resorted to, even in which case the stack mass effect is such as to require from 1½ to 3 or 4 times as much time for the total heating and cooling cycle as is necessary with the continuous furnace.



BELOW—Discharge end of continuous bright annealing furnace. The wire is discharged bright, dry and uniformly annealed

ABOVE—Charging end of a continuous controlled atmosphere furnace, annealing copper wire on spools. The material is pushed through on trays

Photos courtesy of The Electric Furnace Company, Salem, Ohio.

Other Operating Conditions as Compared to Batch Type Practice

In addition to quality of product, economy, simplicity and ease of operation are likewise of importance. Continuous furnace operation for the particular product under consideration will compare very favorably with that of any other type of equipment, as the material is simply placed singly upon the conveyor trays, no great care in loading being required as is the case where the equipment requires the building up of stacks of spools to considerable height. Also, there are no operations to be performed such as bolting of retort covers, transferring of heavy furnace parts from one position to another, etc., as are necessitated with certain forms of the batch type design. Also, if the conveying equipment in the continuous furnace is properly designed and suitable, it will be found to be more economical as to fuel or electric energy costs than other forms of equipment.

Obsolete Forms of Continuous Furnaces

However, there are a number of continuous furnaces in operation on this product, employing steam or gas filled retorts requiring water seals to maintain the retort atmosphere. As the spools are discharged from the retort, and in their passage through the water seal, water is picked up by the wire. Hence, water staining of the bright wire often results, and in any event, it is usual to dry the coils, necessitating an additional operation. With the furnace described in the following, the material is delivered dry as well as bright, so that no drying is required, the annealed material being ready for shipment or further processing or for fabrication.

Economical Sizes of Furnaces and Fuels for Continuous Furnaces

Continuous furnaces may, of course, be built in any size to suit production requirements, but units having productive capacities of 10,000 lbs. and of 15,000 lbs. per 24 hours are very satisfactory as to size. Such units are large enough to give satisfactory operating economies, and small enough to be sufficiently flexible for varying production needs. These units may be fired with gas or electrically heated. The gas fired furnaces require, of course, a retort, and since the requirements for fuel or for electric energy, as the case may be, are very low there is very little in actual dollars and cents saved by the use of even a low cost fuel such as natural gas, as compared to electricity.

Continuous Bright Annealing Furnace Installation

One of these continuous bright annealers, having a capacity of 10,000 lbs. per 24 hours was installed by The Electric Furnace Company of Salem, Ohio, in the plant of a prominent manufacturer of fine copper wire, and has been very successful in its operation. Copper wire in the range of from No. 26 to No. 40 B & S gauge may be handled in this equipment, with a temperature range of 400 to 600° F. as required. The spools are loaded one layer deep on trays, each tray holding about 200 lbs. net. Every 30 minutes a tray is charged into the furnace by means of a hydraulic pusher, and one is removed from the furnace.

This furnace is electrically heated by means of cast grid type heating elements, mounted both above and below the material passing through the furnace, so that heat is applied to the broad surfaces of the charge, and the heat application and uniformity of temperature distribution are, therefore, excellent. The heating elements are automatically controlled as to temperature, and a recording chart pyrometer is employed on the outgoing zone of the heating chamber.

Water cooling is employed in the forced cooling section of the furnace, and the material is delivered from the furnace well under the temperature of discoloration. The copper as delivered from the furnace is bright, dry and uniformly annealed.

Operating Data

Operating costs are very low, especially considering the fine quality of the anneal. When operating at a production rate as indicated above, and at the furnace temperatures employed for the average gauges of wire annealed, the power consumption is approximately 3½ K.W.H. per 100 lbs.

Floor Space Requirements

The furnace equipment is modern in construction, being completely housed in a steel shell, and is quiet and trouble-free in operation. The total floor space requirements for the furnace proper are approximately 4½ ft. in width and 43 ft. in length, and is quite moderate in first cost.

A somewhat similar furnace but larger is now being installed by The Electric Furnace Company in another prominent wire plant.

Spotted Brass

Q.—We are having trouble with spotting out on brass plated steel rods. Samples of rods submitted under separate cover. Can you advise us?

A.—The trouble you are having here is not spotting out in the true sense of the term. The rods you submit show that the real cause of the rapid corrosion and stained appearance is due to insufficient plating. The original brass coating is in itself very thin on the sample submitted and when this is colored on a wheel the deposit is cut through and even entirely removed in many places. As we understand your procedure you do not lacquer the work so that no protection is obtained from such a supplementary coating.

The simplest method of correcting the trouble would be to apply a heavier brass plate—at least heavy enough to stand up on the coloring operation. It would then be advisable to lacquer the work, using the lacquers specially designed and advertised for use on work liable to spotting out.

For work that is to be shipped overseas, or that must show better corrosion resistance, a heavy brass plate cannot readily be applied in practice. This is due partially to the fact that a brass solution does not plate rapidly. It would be better to build up a heavy coating in a copper solution and then give the work a coloring in a brass solution. In this way the major portion of the deposit is applied from an easily controlled solution. Of course this method means an extra handling, but the labor involved is not excessive inasmuch as when the work is taken out of the copper solution it need be given only one rinse and then directly in the brass solution.—G. B. H., Jr.

Recommended Practice for Common Aluminum-Copper Alloys

A Report of Non-Ferrous Division Committee on Recommended Practice of the American Foundrymen's Association, Presented at the Meeting in Toronto, Canada, August 20-23, 1935.—Part 3*.

C. RECOMMENDED PRACTICE FOR THE HEAT TREATED ALUMINUM COPPER ALLOYS[8]

1. Chemical Control Limits.

Alloy	Cu. Percent	Iron Percent	Si. Percent	Zn. Percent	Mn. Percent	Mg. Percent	Ni. Percent	Others
B-21 HT1	4.0-5.0	1.0 max.	1.2 max.	0.25 max.	0.25 max.[9]	0.02	....	Total elements other than Cu-Al 2.5% max.
B-21 HT2	"	"	"	"	"	0.02	....	
B-21 HT3	"	"	"	"	"	0.02[10]	....	
B-22 HT1	3.75-4.50	0.75 max.	0.50 max	....	....	1.25-1.75	1.75-2.25	Total others 0.25% max.
B-22 HT2	"	"	"	....	....	"	"	
B-23 HT1	9.25-10.75	0.90-1.5	....	....	....	0.15-0.35	....	Total others 0.75% max.
B-23 HT2	"	"	....	....	....	"	....	

[9] U. S. Navy Dept. 46A1c class 4—manganese 0.03% max.—zinc 0.03% max.

[10] A. S. T. M. B26-33T Grade GG—Magnesium 0.3% max.

2. Physical Properties of Sand Castings.

	Alloy B-21 HT1	Alloy B-21 HT2	Alloy B-21 HT3	Alloy B-22 HT1	Alloy B-23 HT2	Alloy B-23 HT1	Alloy B-23 HT2
Ultimate Tensile Strength, Lb. per sq. in. (Min. to Avg.)[11]	29000-32000	32000-35000	36000-40000	29000-32000	32000-36000	23000-25000	30000-35000
Yield Strength, Lb. per sq. in. (Permanent Set = 0.2%) (Avg.)	16000	22000	27000	24000	30000	21000	30000
Modulus of Elasticity, Lb. per sq. in. X 10^6 (Approx.)	10	10	10	10	10	10	10
Elongation, Per cent in 2 in. (Min. to Avg.)	6.0-9.0	3.0-5.0	0.0-1.0	0.0	0.0	0.5-1.0	0.0
Brinnell Hardness, 10 mm ball—500 Kg load (Approx.)	65	80	95	95	100	75	110
Ultimate Compressive Strength, Lb. per sq. in. (Approx.)[12]	43000	48000	56000	.....	70000	54000	80000
Specific Gravity (Approx.)	2.77	2.77	2.77	2.79	2.79	2.93	2.93
Weight per cu. in.—Lbs. (Approx.)	0.10	0.10	0.10	0.101	0.101	0.106	0.106
Pattern Maker's Shrinkage, inches per foot	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32	1/10-5/32
Solidification Range—°F (Approx.)	1195-1020	1195-1020	1195-1020	1165-995	1165-995	1160-1004	1160-1004
Electrical Conductivity (Percent of annealed copper standard at 20°C) (Approx.)	35	.....	.....	36	.....	40	37
Endurance Limit, Lb. per sq. in. (R. R. Moore Machine 500,000,000 reversals)	6000	6500	7000	.....	8000	9500	.....
Coefficient of Thermal Expansion (Per °F X 10^6) 68-212°F	12.7	12.7	12.7	12.5	12.5	12.2	12.2
68-572°F	13.8	13.8	13.8	13.6	13.6	13.0	13.0

[11] Tension values determined from standard ½ in. diameter A.S.T.M. separately cast specimens.

[12] Results of tests on specimens having 1/r ratio of 20. All specimens failed by lateral bending.

* Parts 1 and 2 were published in our November and December issues.

The improvement in the mechanical properties of this group of alloys by heat treatment is possible largely because of the composition which must be closely controlled between the limits specified above. The best combination of strength and ductility is obtained by a solution heat treatment followed by quenching (See Section A4). Tensile strength and hardness may then be further increased at a sacrifice of ductility by a precipitation treatment.

The presence of magnesium results in an additional increase in tensile strength and hardness and reduction of ductility by the precipitation heat treatment. Additions of magnesium up to 0.3 per cent are beneficial when maximum strength and hardness are desired and ductility is not necessary.

Nickel is added to alloy B-23 to improve the strength at elevated temperatures and to minimize growth in the castings.

Excess iron content in all of the alloys adversely affects machineability and tends to give a coarse and porous crystal structure.

Silicon in small amounts increases soundness but in larger amounts affects machineability and prevents in some cases, complete and satisfactory heat treatment.

3. Conforming Specifications.

B-21 HT1	Aluminum Company of America	No. 195-T4 Alloy
	Society of Automotive Engineers	No. 38 Alloy
	American Society for Testing Materials	No. B26-33T Alloy G HTT1
	U. S. Army Ordnance Department	No. 57-72-2
	U. S. Navy Department	No. 46A1c Class 4
B-21 HT2	Aluminum Company of America	No. 195-T6 Alloy
	American Society for Testing Materials	No. B26-33T Alloy G HTT2
	U. S. Army Ordnance Department	No. 57-72-5
B-21 HT3	Aluminum Company of America	No. 195-T62 Alloy
	American Society for Testing Materials	No. B26-33T Alloy G HTT3
	American Society for Testing Materials	No. B-26-33T Alloy GG
B-22 HT1	Aluminum Company of America	No. 142-T571 Alloy
B-22 HT2	Aluminum Company of America	No. 142-T61 Alloy
	Society of Automotive Engineers	No. 39 Alloy
	U. S. Army Ordnance Department	No. 57-72-1B Alloy A
	American Society for Testing Materials	No. B26-33T Alloy H
B-23 HT1	Aluminum Company of America	No. 122-T2 Alloy
	U. S. Army	57-72 Grade 6
B-23 HT2	Aluminum Company of America	No. 122-T61 Alloy
	Society of Automotive Engineers	No. 34 Alloy
	American Society for Testing Materials	No. B26-33T Alloy F

4. Development.

The heat treated aluminum-copper alloys were developed to meet the demands of industry for greater strength, ductility, and impact resistance in castings than possible in the common aluminum-copper alloys. The first of the group to be developed was alloy B-21, containing 4 to 5 per cent copper. This has found wide application as a general engineering alloy. Following this, alloys B-22 and B-23 were developed for more specific applications, particularly for pistons and cylinder heads in the aircraft and automotive fields.

The heat treated aluminum-copper alloys are somewhat more difficult to cast than the common aluminum-copper alloys because of certain differences in casting characteristics. The alloys in general possess good hardness and machine well. The corrosion resistance of the alloys, while not so good as that of the aluminum-silicon alloys, is superior to that of the common aluminum-copper alloys.

Alloy B-21 has the best combination of strength, ductility, and resistance to impact. It is somewhat "hot short" and special attention must be given to foundry technique to overcome this tendency. The alloy is not particularly adapted to intricate thin walled castings which must be leak proof.

Alloys B-22 and B-23, developed principally for pistons and cylinder heads, possess high tensile strength, hardness, and resistance to wear at normal temperatures and good strength at elevated temperatures.

5. Field of Use.

Alloy B-21 with its various combinations of mechanical properties possible by heat treatment is widely used as a general engineering material. It is used for crankcases for trucks, motor coaches, and aircraft engines. It is also used for miscellaneous fittings for marine, automotive, outboard motor and aircraft applications. In addition to this, there are many applications of this alloy in the electrical, machine tool, textile, and other industries.

As previously stated alloys B-22 and B-23 are largely used for aircraft, automotive, and marine pistons although they are being displaced to a certain extent by a recently developed aluminum-silicon heat treated alloy. They are also used for cylinder heads on some aircraft engines, thereby utilizing the property of good strength at temperatures of 500 to 600 degrees Fahr.

This Report will be continued in an early issue.—Ed.

Hot Galvanizing Bolts

In our December issue on page 424 we published a short description of a method of hot galvanizing bolts. In the second paragraph the statement was made that the baskets with the bolts after leaving the galvanzing bath and being drained well of the metal, should be placed in a centrifugal machine revolving at a speed of about 900 R.P.M. The article omitted to state that this is known as the Watrous process, covered by patents. We hasten to repair this omission.

A Calendar of Events of Importance to the Metal Industries

1935

JANUARY

Copper & Brass Research Association reorganizes. Mining companies withdraw and fabricators carry on.

Automobile industry begins to show increased activity.

FEBRUARY

Gold clause upheld by U. S. Supreme Court, permitting the Government to pay off its gold bonds in currency.

Business improvement lagging.

MARCH

Federal Housing Administration—Better Housing Program begins to gain momentum.

Cadmium-nickel alloy gaining attention as a bearing material for automobiles.

APRIL

Automobile business continues improvement.

Silver sells up to 81c. per oz. Closes at 75¾.

MAY

Congress passes appropriation of $4,000,000 for "work relief."

Silver fluctuates between 71c. and 77c. per oz.

Spring business disappointing.

NRA declared unconstitutional by the U. S. Supreme Court. All Code Authorities begin immediate liquidation.

JUNE

First Exhibit of Electroplating Equipment and Supplies held by American Electro-Platers' Society at its 23rd Annual Convention in Bridgeport, Conn.

Specification for Electroplating Nickel and Chromium on Steel; Zinc on Steel; Cadmium on Steel presented at Convention of the American Electro-Platers' Society. These Specifications accepted as Tentative by the American Society for Testing Materials at its 38th Annual Meeting in Detroit, Mich.; also approved by the Master Electro-Platers' Institute.

Master Electro-Platers' Association of the Mid-West formed; a branch of the Master Electro-Platers' Institute of the United States.

Copper breaks from 9c. per lb. to 8c.

Silver begins to slip, closing at 69½c. per oz.

JULY

Durable goods industries begin to show signs of revival.

Silver slips to 67.75c. per oz.

AUGUST

United Chromium wins patent suit against General Motors Corporation.

Copper rises ½c. per lb. to 9c.

Silver slips to 65⅜c. per oz.

Business begins to improve.

Platinum drops to the year's low price of $29 per oz. and recovers to $31.

SEPTEMBER

Palmer Hall Langdon, founder, editor and publisher of Metal Industry, passes away.

Business continues improvement.

Copper steps up to 9c. per lb. from 8½c.

Silver "pegged" at 65⅜c. per oz.

Platinum price rises to $34 per oz. from $31.

OCTOBER

Business continues improvement.

Cadmium reaches a price of 85c. per lb., nominal ($1.00 to $1.30 actual) due to scarcity created by large consumption of metal for automobile bearings.

Copper steps up to 9¼c. per lb. from 9c.

Platinum rises to $36 per oz. from $34.

All metals firm to strong.

NOVEMBER

Business improvement continues.

Silver still pegged at 65⅜c. per oz.

DECEMBER

National debt reaches $30,555,791,967, the highest point in American history.

Industrial activity recedes seasonally.

Christmas buying is 9.5% above last year.

Silver falls from 65⅜c. per oz. to 49.75.

A Review of 1935—Prospects for 1936

IN OUR Annual Review just a year ago, we ventured the following prediction:

The coming year has the possibility of showing continued improvement unless interfered with by (1) business men's loss of confidence in the Administration; (2) direct currency inflation; (3) possible catastrophies abroad."

What has happened on these three scores?

1. Business has expressed itself in no uncertain terms as opposed to most of the policies of the Administration.
2. Direct currency inflation did not occur.
3. Europe has for months been on the ragged edge of a new war.

Possibly because the worst did not actually happen, possibly because the expressions of business men were stronger than their true feelings, possibly because the huge sums of money distributed by the various relief agencies of the Government have resulted in freer spending, and consequently more business, possibly because of simple, natural convalescence and a gradual return to economic health, the year continued the recovery which began to be evident in 1934. The first quarter was, on the whole, rather poor for the metal products manufacturing industries; the second, only fair. The third quarter, however, surprised the trade by a real revival—a spurt that not only carried consumer goods up to the point approaching "normal" but also took along with it the heavy industries, machinery and equipment, to levels far above 1934. Activity in the fourth quarter continued at a good rate.

The largest consumer of metal products—the automobile business—staged an outstanding recovery. The electrical manufacturing business gained about 30 per cent; building gained at such a high rate that the percentages were meaningless. The fact that some months showed increases of 100 per cent over the same periods of last year, while encouraging, also showed clearly that the volume in 1934 was pitifully small.

The total of unemployed workers in November was down to 9,177,000, 10 per cent below November, 1934, according to the National Industrial Conference Board.

The war in Africa has had a stimulating effect upon metal manufactures, not so much perhaps by reason of direct orders, as in materials for indirect shipment or use and products for armament for other nations who are preparing against the possibility of a widespread conflagration. The credit of the American Government is still excellent, almost all of its obligations selling above par; its currency is stable and gold is flowing into the country from Europe steadily. World business has also improved during the past year.

The record of the past year indicated definitely, for the first time since the beginning of the depression, that American industrial activity has turned the corner.

Metal Prices

THE record of almost all of the metals throughout the year 1935 was good. Copper, after a break from 9c per pound to 8c, following the debacle of the N.R.A., recovered rapidly due to its good statistical position, and closed the year at 9.25c per pound. Zinc began the year at low levels, averaging 3.728c per pound for Prime Western, f.o.b. St. Louis, in January; moved up steadily, month by month and closed at 4.85. Tin was one of the exceptions to the general rule of firmness. It slipped from an average of 50.866c per pound for Straits, in January, as low as 46.91c, recovered to 52.286, and closed the year with a December average of 49.77c. Tin quotas have been increased regularly throughout the year, and although spot metal is not over-plentiful, futures are on the weakish side. Lead moved upward steadily, after a little slip in February to an average of 3.38c per pound, (E. St. Louis) and rounded out the year with a December average of 4.35. Antimony was a somewhat nervous performer, moving from 14.364c per lb. down to 12.75 in the middle of the year and ending with an average of 14.536. Platinum was also somewhat unsettled, slipping from over $33 per ounce down to $30, but closing the year strong, at $36. Nickel, at 35c per pound for electrolytic, aluminum at 22c per pound, and gold at $35.00 per ounce, were unchanged.

The most extraordinary actor (we can hardly call it a "star") was silver. Silver started on its 1935 career with an average of 54.418c per ounce for January and remained at about the same level in February. In March it took a jump to over 59c; in April to almost 68c; in May to over 74c, with a high point of 81c per ounce. Then the U. S. Treasury decided, evidently, to stop giving speculators a free joy-ride, and allowed silver to react almost as rapidly as it had risen, until in September it had dropped to 65.375. Then history was made afresh when the metal remained fixed at that point for over three months without a change in price. This must have been considered too good to last, for in December the peg was pulled and silver dived under 50c. The average for December was 58.42. Why? For what? To what end? Only those in charge of the U. S. Treasury operations know.

Technical Developments

ALONG the lines of technical improvements the year was fruitful. Although nothing revolutionary occurred, there were many improvements.

In the brass industry pressure casting of brass is gaining steadily, somewhat to the detriment of the sandcasting industry. The American Foundrymen's Association has started a very meritorious project—the systematic diagnosis and cure for defective castings. This material will be published in the form of Recommended Practices, the first set of which on Aluminum has been appearing serially in **Metal Industry.** The practice of conditioning molding sands is also growing steadily. In the brass rolling mill we have seen new annealing furnaces developed, bearings and other mechanical features improved and last, but probably the most important, progress in the continuous casting of sheet from the molten metal.

In electro-metallurgy and to us its most important branch, electroplating, several features have stood out clearly. One of the most important has been the promulgation of specifications for nickel, chromium, cad-

mium and zinc on steel. Along with these specifications have come improved methods of testing. Bright nickel plating is growing in popularity. Bright zinc plating is attracting wide interest because of the outlandishly high price of cadmium since the automobile industry took it up for a bearing material. Other developments of wide interest are the aluminum coating of steel; the use of amazingly high current densities for plating zinc, copper, nickel and iron; the building of a generator of previously unheard of size, 40,000 amperes. Research is going ahead steadily at the Bureau of Standards, sponsored by the American Electro-Platers' Society. The project ahead is a testing program of plates on non-ferrous metals.

In metal products manufacturing, one of the interesting features has been the increased use of carbide cutting tools, increasing operating speeds by the extraordinary hardness and long life of these tools.

Ingot makers report improvement throughout the industry in the uniformity and reliability of their output due to improved control methods and larger and better operated melting furnaces. An improvement which is attracting wide attention is the use of an alloy of 0.1 per cent calcium, balance lead, for storage battery grids. Beryllium-copper alloys have found new applications, such as molds for the manufacture of plastics, worm gears and heavy duty bearings.

Economic Developments

TWO occurrences of a general nature stood out above all others during the past year. General as they were, they affected every business in the land. The first was the decision of the United States Supreme Court, permitting the Government to pay off its gold bonds in currency. The second was another decision of the Supreme Court which declared the N.R.A. unconstitutional. A revised N.R.A. has since bogged down badly, and has been finally discarded.

A very encouraging trend of the year has been the improvement in the heavy or capital goods industries. Manufacturers of equipment, machinery for foundries, rolling mills, manufacturing plants and plating shops, report tremendous percentage increases over 1934. Obviously the reason is the low state of affairs in the previous year. Nevertheless, it is improvement.

The automobile industry was decidedly on the upgrade; also refrigeration and air conditioning; all of which resulted in an increased use of metal products as these three industries are huge consumers.

The year witnessed the wider use of nickel in new alloys and in new industries. The use of aluminum in the heavy equipment field, such as railroad and construction, increased markedly. Another recent development is the use of tin cans for beverages. Tin plating for cast iron pistons has dropped back somewhat under the competition of aluminum pistons anodically treated. Zinc is being consumed in steadily growing tonnages by die castings.

The jewelry industry is getting back on its feet, but as always, being a luxury industry, it is among the last to feel the recovery. Nevertheless yellow gold, platinum and palladium plated products enjoyed a good season. Rhodium also was in good demand, not only for jewelry but for reflectors.

The silver manufacturing industry has been all but disrupted by the gyrations of the silver market. When a manufacturer's raw material moves from some 40c per ounce to over 80 and then back to under 50, he is no longer only a manufacturer, but must necessarily be a gambler in raw materials. At this time, no one outside the U. S. Treasury Department knows whether silver is afoot or horseback.

Prospects for 1936

ONCE again we turn our faces forward. What of 1936? From the light thrown by the past—the immediate and long past—the prospects are encouraging, providing we do not expect too much or guess too far ahead. The concensus of informed opinion seems to be that a gain of approximately 10 per cent of 1935 is in order. This will bring the business index to somewhat around 95 against a "normal" of 100. The automobile industry hopes for a 20 per cent rise. We most certainly hope that they are right, but we can remember a number of years when the enthusiasm of youth led this industry into exuberant promises. Home building should go much higher in 1936 but it is still so far below a fair level that too many hopes cannot be based upon it. In approximate figures, 100,000 family units were built in 1935. In 1936, 200,000 are expected. It cannot be overlooked, however, that a normal year in housing calls for over 500,000 units. Railroads are far behind in their purchases of equipment; they are also, however, far behind in their earnings and they cannot buy much.

The general business sentiment at this time is decidedly optimistic and this is the greatest single, encouraging factor. The steel industry plans to spend $100,000,000 for expansion and rehabilitation. According to the National Machine Tool Builders' Association, a $938,000,000 program of plant modernization and expansion projects, initiated by American industry during the past six months, provides a most tangible insurance of continuance of the current business revival. We have, however, an extraordinary anomaly in the present situation. We still have over 9,000,000 people unemployed who are dependent upon public funds for their support. Public funds cannot go on supporting them indefinitely as the public credit will not stand an indefinite number of $3,000,000,000 to $4,000,000,000 annual deficits. These people must be reabsorbed by industry and business, largely the capital goods industries in which activity is still below par and unemployment, consequently high. We are faced moreover with the fact that 1936 is a presidential election year. How will business act during this time? We know that many have already placed themselves on record as against most of the measures of the "New Deal." The National Association of Manufacturers at its annual meeting, issued a statement, which, in one of the daily papers, was likened to a pronouncement of the Republican National Committee! Whether such bluntness or lack of diplomacy will help to change the course of the Administration is open to question. We are faced with a veterans' bonus which seems very likely to be passed during the present session of Congress. This will cost from $1,000,000,000 to $2,000,000,000, which is certain to knock the annual budget into a cocked hat.

Abroad, a fire is burning in Africa, which is surrounded by inflammable material and may overnight spread all over Europe. So far, for us, the result has been some additional business. If the fire should spread, it would be a major catastrophe to the world and in the long run, we might find it impossible to stay out of conflict.

The corner has been turned. We are on the way out of the Valley of Despair, but the road is rough and steep, and many dangers lie ahead.

New Books

Brass Founders' Manual, by Sam Tour, Consulting Metallurgist, Vice-President, Lucius Pitkin, Inc., in co-operation with W. J. Reardon, President, National Alloys Company, Associate Editor, **Metal Industry.** 5¼" x 8"—43 pages; free to subscribers of **Metal Industry** or Platers' Guide.

This is the first (1935) edition of the booklet presenting to the non-ferrous foundrymen, information on foundry practice for the most important standard alloys of the Copper Base, Aluminum Base and Nickel Base groups. The brass foundry industry has long needed a pocket reference work. This Manual is not a long-winded textbook or a heavy scientific tome. It is a concise, handy, easily readable book for the practical man.

The Copper Base Alloys described fall into seven groups: Bronzes; Valve Bronzes and Red Brass; Semi-Red Brasses; High Lead Bronzes; Yellow Brasses; Manganese Bronze; Aluminum Bronze. The Aluminum Base Alloys are divided into six groups: Aluminum Copper Alloys (Common); Aluminum Copper Alloys (Heat Treatable); Aluminum Silicon Alloys (Common); Aluminum Silicon Alloys (Heat Treatable); Aluminum Copper Silicon Alloys; Aluminum Magnesium Alloys. Nickel Base Alloys are divided into two groups: High Nickel (nickel over 50%); Nickel Bronze and Nickel Silver.

In addition to the detailed description of the methods of handling the above alloys, special sections are devoted to control methods and the equipment required. A number of tables are included, such as Basic Specifications for Copper Base Ingots, Specifications for Secondary Aluminum and its Alloys and also a description of the Sand Grading Classifications of the American Foundrymen's Association, under which a growing section of the non-ferrous foundry industry is operating.

This booklet will be reprinted with additions and changes to bring it up to date from year to year. It is an excellent companion booklet for Platers' Guidebook, which has become so popular.

The Manufacture of Metallic Articles, Electrolytically-Electro-Engraving, by Dr. W. Pfanhauser; authorized English translation by Professor Joseph W. Richards. Published by the Chemical Publishing Company (1906 Edition). Size 6 x 9; 159 pages. One of a group of standard works being sold at very much reduced prices. This book originally was priced at $1.50; present price 75 cents. It covers the manfuacture of metallic powders, metallic foil, wire, tubes, etching, engraving, miscellaneous products, etc.

Transactions of the Institute of Metals Division, A.I.M.E. 1935. Volume 117. Published by the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers. Size 6 x 9, 418 pages; price $5.00 to non-members.

A compilation of the papers and discussions presented at the meetings in New York, October, 1934, New York, February, 1935, and Chicago, October, 1935. Abstracts of these papers appeared in **Metal Industry** for November, 1934; March, 1935 and November, 1935.

American Machinists Handbook. Published by McGraw-Hill Book Company. Size 4 x 6½; 1,146 pages. Price $4.00. This revised book of machine shop and drafting room data, methods and definitions compiled by F. H. Colvin and Frank A. Stanley, is now in its 6th edition. It contains over 2,500 illustrations, diagrams and tables. Some of the high spots are as follows: two large treatises on machine shop methods; manual of shop trigonometry; a large number of useful tables; data on special fields, automotive shops, railroad shops, etc.; a section on authoritative standards; a dictionary of shop terms; completely indexed.

The Structure of Metallic Coatings, Films and Surfaces. A general discussion held by the Faraday Society in London, England, September, 1935. Size 5 x 9½; over 300 pages. Price 21s, 9d including postage.

This collection, reprinted from the Transactions of the Faraday Society, includes the papers and discussions presented at its September, 1935 meeting. Although the character of the papers is highly technical to scientific, a number of them deal with extremely practical problems, such as: The Influence of the Basis Metal on the Structure of Electrodeposits; Factors Affecting the Structure and Grain Size of Electrodeposited Cadmium; Improvement of the Quality of Sprayed Metallic Coatings by the Use of Non-Metallic Intermediaries and Supports; Factors Influencing the Formation and Structure of Hot Dipped Tin Coatings.

The Metallurgy of White Metal Scrap Residues, by E. R. Thews. Published by D. Van Nostrand Company. Size 6 x 9; 383 pages. Price $5.50.

This is the only comprehensive book on the subject of the recovery of metallic values from scrap, dross and other residues. The author, who has had considerable practical experience, covers the following subjects: Smelting Tin and White Metal Residues; The White Metal Alloys; Type Metals; Soft Solders; Pewter; Britannia Metal; Fusible Alloys; Shot; Melting and Refining of White Metal Scrap; Smelting Treatment of Lead Residues; Lead Slags; Construction and Operation of Lead Blast Furnaces; Blast Furnace Coke; Refining of Secondary Work Lead and Lead Scrap; Metallurgical Treatment of Zinc Scrap; Remelting Aluminum Scrap and Residues; Reverberatory Furnaces; Refractories for Metallurgical Furnaces; Crucible Furnaces; Melting Crucibles; Design and Care of Iron and Steel Melting Pots;Precipitation and Recovery of Flue Dust; Treatment of Flue Dust and Fumes; Chimneys; Sampling of Scrap and Residues; Standard Classification for Old Metals (American); German Trade Specifications for Old Metals, etc.

The above subjects are covered from the technical as well as practical point of view. It is a very valuable book.

Directory of New York State Manufacturers. Published by the New York State Department of Labor, 80 Centre Street, New York City, in two volumes Price, reduced to $1.00 for Volume 1 and $3.00 for Volume 2. This directory compiled late in 1933 on 1932 reports is the latest publication of its kind and the first issued in twenty years. The information and statistical data on the 42,000 factories listed have been broken down and clarified in many ways. The types of manufacturing operations are classified and sub-classified. Among the 18 principal classifications of manufacturing are metals and metal products, machine shops, transportation equipment, miscellaneous manufacturing, etc.

Tentative Standards of the A.S.T.M. 1935 Edition. Published by the American Society for Testing Materials. Price $8.00 in cloth; $7.00 in heavy paper cover.

This annual publication is the only volume containing all of the A.S.T.M. Tentative Standards, methods of testing and definitions of terms covering engineering materials and the allied testing field. The book contains 290 tentative standards, including 32 on non-ferrous metals of which many are new or revised. A complete index has been included.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

ASSOCIATE EDITORS

H. M. ST. JOHN W. J. PETTIS W. J. REARDON W. B. FRANCIS
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Brown on Brass

Q.—At the plant in which I am foreman finisher, we do quite a bit of oxidized work. I am especially interested in a good rich brown oxidize on brass plated steel. We are now using a mixture of golden sulfuret of antimony and ammonia. This is quite an expensive dip to operate and it does not give us exactly the color we desire. I have tried out many different formulas for a brown color on brass plate, but very few are practical on a production basis. Could you help me on this problem?

A.—A rich brown oxidized finish may be obtained on brass plated steel articles by the following procedure:

1. Dip in 5% sulphuric acid pickle, rinse in cold water.
2. Scratch brush wet with brass wire wheel (.003" wire) with pumice.
3. Dip in 3% liver of sulphur solution.
4. Scratch brush wet with brass wire wheel.
5. Dip in 3% liver of sulphur solution.
6. Scratch brush dry with brass wire wheel and lacquer.

If a very uniform color is desired brassed plated articles should be buffed and colored prior to oxidizing although a satisfactory color may be obtained directly without polishing.

—T. H. C., Problem 5,452.

Copper Strike to Prevent Peeling

Q.—We have used a copper cyanide plating solution to give our sheer blades a copper strike before nickel plating. The parts are only in the copper tank approximately one-half minute. We have had considerable trouble in keeping this tank working properly and it has caused considerable peeling. At this time we are not using it, but are plating direct on steel.

We would like to have you advise us if there is any advantage in the copper strike, or if you would recommend eliminating this operation entirely.

A.—The difficulty you have been experiencing with peeling may be due to improper cleaning methods or poor condition of the cyanide copper solution but it is more likely due to the deposition of nickel over an improperly rinsed copper deposit.

If all traces of cyanide are not removed from the work before placing in the nickel solution peeling will occur due to the precipitation of basic nickel compounds on the surface before metallic nickel is deposited.

In some classes of work the complete rinsing clean of cyanide is difficult due to adsorption in the pores of the copper deposit. On shear work such as you are doing it should be possible to nickel plate directly on the steel and obtain good adhesion. It is important of course that perfect cleaning and pickling be performed. It is advisable in the nickel plating operation to use a fairly low voltage and certainly not to exceed two volts pressure or excessive evolution of hydrogen will occur and the adhesion of the deposit will be weakened.

—G. B. H., Jr., Problem 5,453.

Cream of Tartar Silver

Q.—I would like some information in regards to using the cream of tartar method on watch dials. How is this solution or paste made up?

A.—Two types of silver paste are used in contact plating of watch dials depending on finish desired.

A paste made up according to the following formula is used for circular or scratch brush finish:

Silver chloride	4 parts by wt.
Cream of tartar	8 parts by wt.
Sodium chloride (salt)	1 part by wt.

Add enough water to make thick paste, apply with moistened leather.

A mat or dull white finish may be obtained by using a paste of the following composition:

Precipitated silver	1 part by wt.
Cream of tartar	2 parts by wt.
Sodium chloride	2 parts by wt.

Mix dry, add enough water to moisten. Apply with stiff brush.

—T. H. C., Problem. 5,454.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: ..... **width:** .....**Solution depth:** .....

Anode surface, sq. ft.: .....**Cathode surface, sq. ft.:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:** .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Dark Nickel Plate

Q.—Under separate cover we are sending you samples of our nickel plated brass parts and a sample of the solution.

For the past month or so (the solution is eight months old), we have been getting a darker and more yellowish plate than formerly and can not determine the trouble.

The barrel is a barrel plater containing a 100 gallon solution. The original formula of the solution is:

200 lbs. Single Nickel
25 lbs. Double Nickel
20 lbs. Nickel Chloride
15 lbs. Boric Acid

Plating conditions are maintained at:
6 to 6½ oz./gal.—Metallic nickel
2½ oz./gal.—Chlorides
5.5 to 5.7—pH
95 to 100° F.—Temperature
9 to 10 volts
95 to 100 amps.
95-97% Anodes. Curved oval type.
16—number of anodes

The barrel is loaded approximately half full of parts.

We are aware that copper gets in the solution because it appears on the back of the anodes. This is removed at intervals by raising pH to 6.7, filtering and lowering again to 5.6. The front of the anodes stays rather dark and black looking.

The solution tends to decrease in nickel content and increase in pH.

Parts are cleaned and bright dipped in the usual manner. They are burnished in steel balls with a soap compound before and after plating.

A.—Analysis:

Metallic nickel	5.10 oz./gal.
Chloride	2.46 oz./gal.
Chloride as ammonium chloride	3.70 oz./gal.
pH	6.3

The pH is too high. Add 4 fl. oz. sulfuric acid to the whole solution. To bring the metal content up to the maintained value add 5 oz./gal. of single nickel salts. Add 1 oz./gal. of boric acid.

The precipitation of the copper is hastened by heating the solution to 140 deg. Fahrenheit. Copper can also be removed by lowering pH to 5.0 and hanging steel or iron in the solution. Remove the anodes. The same burnishing barrels should not be used for both brass and nickel plated work if possible, due to the fact that when rolling brass, the barrel and steel balls will pick up a certain amount of copper which is transferred to any subsequently rolled nickel plated work. If it is not possible to use separate barrels, the barrel should be washed thoroughly.

G. B. H., Jr., Problem 5,455.

Dip Silver

Q.—We would like to have the formula for a silver dipping solution.

A.—A silver dip or immersion solution for copper and brass articles that will deposit a thin coating of silver may be made up as follows:

Silver cyanide	3.00 troy oz./gal.
Sodium cyanide	7.75 oz./gal.
Temperature	140-150 deg. F.

Articles should be constantly agitated in solution to obtain a uniform deposit. It is possible to brush parts after immersion to remove any slight discoloration.

—T. H. C., Problem 5,456.

Gold on Buttons

Q.—We are enclosing a sample button which we are to gold plate so that each gross will have half a penny weight of gold. As we have a very large order of these to plate we would appreciate it very much if you will give us suggestions as to what to do in order to be sure that we have put on two grains of gold to the dozen or one half penny weight to the gross.

We are not interested in the cleaning or preparing process as much as we are in having as approximately an exact method of depositing the required amount of gold as possible.

We use with our gold a 10 volt 125 ampere generator without a rheostat but can put one on if necessary in this case. The solution is 2½ gallons and use carbon or steel anodes. We use the solution hot.

Are there any instruments on the market which will help us?

A.—The best procedure in this case would be to load the tank with work and adjust the ammeter so that the current density is from 1 to 5 amps. per square foot of surface. The work should be taken out from time to time and weighed, the time of plating being noted. When the pieces have received the required deposit, all that is necessary is to plate for the same length of time at the same temperature, with the same total current and number of pieces. It will be necessary to use gold anodes to maintain the solution. A rheostat will be necessary for the current control. In order that the efficiency of the bath should not change, analyze the solution for the free cyanide and gold content and to make the required additions. This should be done daily.

A general check of the amount of gold deposited can be obtained by weighing the anodes at intervals. A Sangamo meter can be used.

—G. B. H., Jr., Problem 5,457.

Iron on Cadmium Solution

Q.—Would appreciate knowing what effect a small iron content would have in a cadmium plating solution. This is a still plating tank and contains some patented brightener.

A.—Small amounts of iron in a cadmium plating bath apparently have no detrimental effect. However, if the iron, as ferro-cyanide, reaches a concentration of ¼ oz. per gal. it will interfere with the estimation of the total or free cyanide. Ferro-cyanide increases the resistivity of the solution and will cause coarse, rough crystalline deposits.

—T. H. C., Problem 5,458.

Pitted Silver

Q.—We are having trouble in silver plating on nickel silver and are sending you a sample of our silver strike and silver solution to see if you can determine what is wrong with them. The finish is for a bright Butler Finish. The finished item shows very fine pit marks.

A.—The analysis on the solution shows:

Strike solution—

Silver	8.3 dwt./gal.
Free sod. cyanide	6.1 ozs./gal.

A good strike contains 10 dwt./gal. of silver and 10-12 oz./gal. of sodium cyanide.

Regular silver solution—

Silver	1.8 tr. ozs./gal. silver
Free sod. cyanide	4.9 ozs./gal.

The free cyanide is too high while the silver content is somewhat low. By adding 2.0 ozs./gal. of silver cyanide the silver content will be increased to 3.4 ozs. and the free cyanide will be reduced to 4.2 ozs. per gallon, which is still somewhat high but which will gradually be reduced as the solution is worked.

Nickel silver requires a slight etch in order to have the silver deposit stick. After cleaning the work dip it in a strong muriatic acid (50%), or in a sulphuric-nitric bright dip, or make cathode in a 45 deg. Baume sulphuric acid. Whatever etching procedure is used it must not be continued to the point where the luster of the metal is destroyed.

—G. B. H., Jr., Problem 5,459.

Rust Preventive

Q.—Please advise if you are in a position to recommend a solution to prevent rust on cold rolled steel that is soft soldered.

In manufacturing certain instruments it is necessary after polishing to assemble them by soft soldering and it seems the acid from the solder causes rust when they are left lying around. If we had a solution wherein we could dip these instruments after they are soldered it would eliminate this trouble.

A.—After soldering place articles in a 5% solution of sodium carbonate (soda ash).

Renew this solution daily.

Rinse in cold water, dry in sawdust.

Then rinse in hot water to which a small amount of neutral soap is added; 4 ozs. soap to 50 gallons of water. Then dry. The soap film will give a few days protection against corrosions.

—G. B. H., Jr., Problem 5,460.

Practical Brass Foundry Digest

By H. M. ST. JOHN

Chief Metallurgist, Detroit Lubricator Company; Associate Editor, Metal Industry

Short Abstracts of Articles of Interest to Practical Non-Ferrous Foundrymen and Metallurgists

The Pressure Die-Casting of Alloys. Ladislav Jeniceck. Metal Industry (London), Vol. 47, p. 411, Oct. 25th, 1935.

Copper-base alloys, as well as zinc-base and light alloys, are discussed. For copper-base alloys the "cold-chamber" method, using a high hydraulic pressure, must be used. The metal, when pressed into the mould, is in a pasty rather than a molten condition. The Polak and Buehler machines are described and illustrated. Brasses, bronzes, nickel silvers and aluminum bronzes are being cast successfully but wide application of the process is still restricted by the comparatively short life of the best die steels available. Die-cast brass (60 copper, 40 zinc) has tensile strength approaching that of forged brass and elongation approaching that of sand-cast brass.

Production of Sound Bronze Ingots; Problems of Deoxidation and Degasification. Edmund R. Thews. Metal Industry (London), Vol. 47, p. 419, Oct. 25th, 1935.

In the reverberatory furnace it is more difficult to produce bronze ingots free from oxide and gas inclusions than is the case in crucible melting. In reverberatory practice the bronze scrap used should first be cleaned from oxides by steel-brushing, sand blasting or tumbling. Very light scrap, if heavily oxidized, should be melted in crucibles, then remelted, if desired, in the reverberatory which is better fitted to produce large lots of uniform composition. The reverberatory, which should be thoroughly heated before any metal is charged into it, is preferably operated with a slightly oxidizing atmosphere to avoid excessive gassing of the metal, which should also be covered with a suitable flux. Glass, which has a high solvent capacity for oxides and other impurities, is also probably the most efficient flux to prevent oxidation and gasing of the bronze. Green bottle glass is best and, if necessary, can be combined with barium peroxide (to overcome gassing) or sodium carbonate (to remove sulphur), or, when the metal is fully melted, the glass flux may be removed and a special refining flux employed. A suitable flux consists of sodium and potassium carbonates with barium peroxide or charcoal. It is important to employ proper precautions in charging and pouring the metal, and in the preparation of moulds, in order to avoid conditions which may tend to oxidize or gas the metal.

The Rotary Furnace in Foundry Practice. R. Boutigny. Metal Industry (London), Vol. 47, p. 445, Nov. 1st, 1935.

Fuel-fired rotary furnaces have largely taken the place of crucible furnaces in bronze melting because of their greater convenience and economy. Heavy fuel oil, preheated, is the usual fuel, with a furnace lining of neutral bauxite bricks if slags of glass and carbonate of soda are to be used. Furnaces are often oscillating rather than rotary and are charged either through the side or at the axis. Metal is more subject to oxidation than when melted in crucibles and must be protected by a suitable slag and by control of the furnace atmosphere. Typical performance of a 400 kg. (880 lb.) furnace, melting 85 copper, 8 tin, 5 zinc, 2 lead for tap fittings, is given as 9 heats per day, 1.25 per cent heat loss (metal loss), 8 per cent oil consumption, 400 casts refractory lining life. Nickel and cupro-nickel are melted in similar furnaces. In the production of brass and bronze ingots, turnings are melted in oscillating oil-fired furnaces having capacities of 1500 to 2000 kg. (3300 to 4400 lbs.), which produce a more uniform composition at lower cost than is the case with crucible furnaces. The tumbling action of the oscillating furnace has also proved of advantage in the recovery of metallic lead from old accumulator plates.

The Production and Control of Bronze Castings. Francis W. Rowe. Metal Industry (London), Vol. 47, p. 459, Nov. 8th, 1935.

In a lecture given before the Midland Metallurgical Societies, Rowe states that if castings are to approach wrought metal in quality, materials free from detrimental impurities must be melted under best conditions. Both crucible and reverberatory furnaces do excellent work but are likely to produce gased metal if not properly controlled. R. thinks the electric furnace capable of producing the highest physical properties obtainable with bronze alloys and describes the rocking arc-type furnace used in his experiments. A number of tables, with micrographs and macrographs, are given to show the results obtained by different methods of casting, including sand casting, chill casting, die casting, and centrifugal casting. The centrifugal method results in the highest density and smallest grain size, achieving a density of 8.8 in a bronze containing 89.5 per cent copper, 10.5 per cent tin. As compared with sand-cast metal, centrifugal test pieces yielded physical properties from 30 to 50 per cent higher in several common bronzes, including 85 copper, 5 tin, 5 zinc, 5 lead. The only mould materials used were sand and cast iron but R. thinks that others might give an intermediate rate of solidification. A patented concrete mould now under development in France may be one answer. The concrete, consisting of 10 per cent cement, 6 or 7 per cent water, balance silica sand, must set for 24 to 48 hours before the mould can be used.

Overcoming Gas Conditions in Phosphor Bronze. M. T. Ganzauge. Foundry, Vol. 63, p. 32, Nov., 1935.

Cylindrical castings, approximately 3 ft. long by 1½ ft. diameter, composition 80 copper, 10 tin, 10 lead, 0.10 phosphorus, metal melted in crucibles, are discussed. Various methods of gating tried. Conclusion is that gas porosity is due to improper furnace atmosphere, which should be truly neutral, neither oxidizing nor reducing. Variation of pressure in natural-gas and compressed-air lines was a source of trouble. Better results were obtained by substituting a positive pressure blower in place of connection with the compressed-air system.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

Featherweight Foundry Flask

An American Featherweight Flask is now being manufactured by The American Foundry Equipment Company, 408 Byrkit Street, Mishawaka, Indiana. This flask is said to have four outstanding features, according to the manufacturers, these being:

(1) Light weight.
(2) Strengthened corner construction.
(3) Especially designed pin pad.
(4) The production increasing sand strip.

It is made of magnesium alloy, over 30% lighter than aluminum and is lighter than many snap flasks. Although lighter in weight, the American flask, it is claimed, has greater tensile and bending strength than aluminum.

The new corner design of riveted construction gives the utmost strength to the American Flask. There is no welding or pouring of corners, thus eliminating all possibilities of distortion or the flask becoming out of square.

Featherweight Flask

The patented pin pad permits the use of any standard pin. Pins which are now standard can be supplied on the new flask.

With a maximum taper of 5°, the Featherweight flask allows for easy stripping. The exclusive sand strip design enables this maximum taper. It protrudes an equal distance completely around the flask, providing a firm support for the sand in the cope. The sand strip is cadmium plated, eliminating rusting and sticking.

Coating Steel With Aluminum

Far-reaching effects on building and construction, airplane and automobile design, rail equipment, and industrial machinery are foreseen as a result of a process perfected by Prof. Colin G. Fink, head of the Division of Electrochemistry in Columbia University, for coating steel with aluminum.

Homes made entirely of sheet metal and glass are now possible for the first time in history, according to Prof. Fink, holder of the Acheson Medal of the Electrochemical Society, and the Perkin Medal of the Society of Chemical Industry for his inventions in metallurgy and electrochemistry. The new material can be colored. It is malleable and ductile, and can be formed into decorative parts as well as into floors, walls, roofs, girders, and all other parts of construction. Combining the high corrosion resistance of aluminum with the tensile strength of steel, more than three times that of aluminum, the metal will find uses in fields hitherto barred to steel because it corrodes, or to aluminum because of lack of strength and endurance.

According to Dr. Fink, the failure in the past to coat steel with aluminum was due to lack of appreciation of the inherent properties of aluminum, which differ from those of zinc and tin. Adherent and substantially uniform, smooth, bright coatings of aluminum are said to be obtained on steel by Prof. Fink's invention, which consists of saturating the surface of the steel with hot hydrogen gas before dipping it into a molten aluminum bath. This process, it is claimed, insures a perfect bond between the steel base and the aluminum coat. Aluminum is very readily oxidizable in its molten state, and if oxides become interposed between the article to be coated and the aluminum, the covering will not stick.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

12″ Type "T" Semi-Automatic Manufacturing Lathe; designed to handle the smaller classes of production jobs where a quick, convenient hand return to the tool slide is desirable. The Monarch Machine Tool Company, Sidney, Ohio.

Low Amperage Welding; for air conditioning installations and other light gauge metal assemblies. L. J. Mueller Furnace Company, Milwaukee, Wis.

Alnico—A New Powerful Magnet; composed of iron, aluminum and nickel. Developed by the General Electric Company which has licensed the Simonds Saw and Steel Company of Lockport, N. Y., to manufacture and sell magnets of the new alloy.

Portable Sanders. A new line, more powerful; completely dust and grit proof. Black and Decker Manufacturing Company, Towson, Md.

Stapling Machine; with a magazine which carries a thousand staples in a single load; known as the Paslode Palmgren Thousand Load Tacker. Paslode Company, Merchandise Mart, Chicago, Ill.

New Visible Lubricator. An addition to the line of Opto-Matic, constant level lubricators; known as the No. 3 size; also a "Drip-Drop," bottle type oiler for solid, wick or waste-packed bearings. Trico Fuse Manufacturing Company, Milwaukee, Wisc.

Fully Automatic Weighing and Batching; operated from a distant point by photo-electric cell cut-off control. Toledo Scale Company, 227 Park Avenue, New York.

Draft Controller; a complete, self-contained furnace draft controller requiring only a draft connection to the furnace and a supply of compressed air at approximately 35 pounds pressure. Bailey Meter Company, 1050 Ivanhoe Road, Cleveland, Ohio.

Tube Hastellite. A new hard-facing welding rod, consisting of hollow steel rod, the center of which contains crushed and screened tungsten carbide particles. Haynes Stellite Company, 205 E. 42nd Street, New York.

Paint in Stick Form. Markal paint sticks used for marking any material; not a crayon, but a true paint. Helmer and Staley, 2446 South Parkway, Chicago, Ill.

Seismo-Damper Type "T"; for vibration isolation for medium and light machinery. The Korfund Company, 48-15 Thirty Second Place, L. I. City, N. Y.

Vernier Valvactor. A new accessory for air-operated control valves, developed to eliminate valve sticking and to assure hair-line valve positioning. The Foxboro Company, Foxboro, Mass.

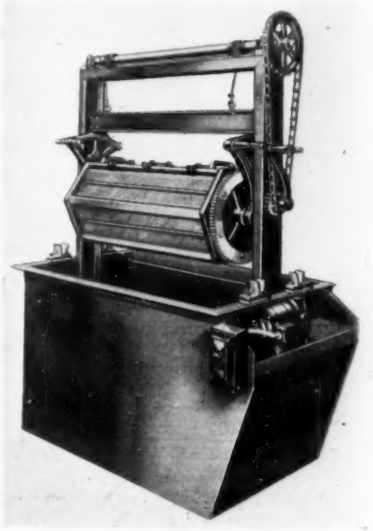
Cesco Toe Guard; to prevent injuries to toes; fits all shoes. Chicago Eye Shield Company, 2300 Warren Boulevard, Chicago, Ill.

Mechanical Plating Barrels

A new line of mechanical plating barrels has been placed on the market by the Belke Manufacturing Company, 947 N. Cicero Avenue, Chicago, Ill. It is stated that these barrels plate faster, at lower cost, because of a special method of distributing the current. An oversize bronze conductor is entirely covered with layer upon layer of rubber, resulting in very little waste of current. The chromium plated brass danglers are said to give an even and uniform current distribution, and to take up very little of the metal in the solution.

For those who cannot use the dangler arrangement, optional equipment is provided which leaves the interior of the cylinder wide open, exposed metal strips running the full length of the ribs. Projecting buttons can be placed upon the exposed metal strips, allowing the current to feed right into the center of the work being plated.

These units are equipped with the Belke line switch. Treeing is said to be impossible. The hard labor often associated with plating barrels is eliminated by the hanger mechanism. The cylinders, it is claimed, are non-warping and will withstand high temperatures. Cylinder ends, hangers and brackets are not in the plating circuit, anode or cathode.



Belke Plating Barrel

Semi-Automatic Plating Machine

The Udylite Company, 1651 E. Grand Boulevard, Detroit, manufacturers of polishing and plating supplies and equipment, announce the development of a new semi-automatic plating machine. This new machine is said to offer the advantages of better plating results, closer production regulation and lower plating costs. Construction of the new unit, it is stated, includes a number of improvements in design which contribute to lower operating cost and a minimum of maintenance expense.

The machine can be set and work plated so that the desired thickness specification is produced. Production can be regulated within very close limits. The work racks are hung on the chain conveyor and are carried away from and brought to the operator at a definite rate of speed. Any desired chain speed between 1 and 4 ft. per minute is obtainable.

In addition to money savings through reduction of rejects and closer production regulation, the Udylite Semi-Automatic, is said to effect still further savings in that one man can do the work

Close-up of Udylite Chain-Cathode Hook Combination

of two or possibly three with several still tanks. In the construction of the Udylite Semi-Automatic, attention has been paid to simplicity, compactness and durability. Design features include strong structural steel chassis . . . new, simplified chain-hook combination . . . alloy steel chain with breaking strength exceeding 5 tons . . . cut tooth drive sprockets . . . equipped throughout with ball and roller bearings which need lubrication but once every six months . . . hoops designed for heavy loads . . . high current carrying capacity.

The Udylite Semi-Automatic is made in a wide variety of sizes to conform to the individual plating problem.

Side-View of 18 Ft. Udylite Semi-Automatic Plating Machine

Metal Radio Tube Coating

The new metal radio tubes are made of steel and coated with a new type of black lacquer. The Stanley Chemical Company of East Berlin, Conn. has developed an air drying dull black lacquer that is being sprayed onto these tubes by several prominent manufacturers.

One unusual demand is that the coating must not smoke or give off any odor when a tube is in operation. The operating temperature of many types of tubes is about 350°F. In addition the coating must have unusual hardness and adhesion and good resistance to rusting even after long and intermittent heating. The manufacturer reports that this lacquer is ideally suited for numerous other products where genuine quality and economy are the primary requisites. Inquiries should be addressed to The Stanley Chemical Company, Dept. M, East Berlin, Conn.

Use of Korolac as a Protective Coating on Electroplating Racks

By Dr. H. E. FRITZ

The B. F. Goodrich Company, Akron, Ohio

Korolac is a solution of Koroseal, a new synthetic rubber-like material, recently developed in the laboratories of The B. F. Goodrich Company, Akron, Ohio. At normal temperatures this material is a jelly-like substance but when heated becomes liquid and it is in this form that it has been so successfully applied as a protective coating

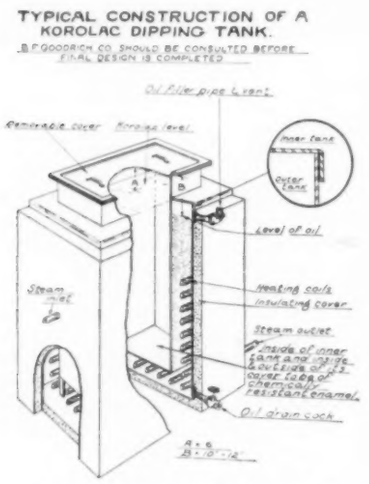

TYPICAL CONSTRUCTION OF A KOROLAC DIPPING TANK.
B.F.GOODRICH CO. SHOULD BE CONSULTED BEFORE FINAL DESIGN IS COMPLETED
Oil fill pipe & vent
Removable cover
Korolac level
Inner tank
Outer tank
Level of oil
Steam inlet
Heating coils
Insulating cover
Steam outlet
Inside of inner tank and inside & outside of outer tank of chemically resistant enamel
Oil drain cock

Fig. 1. Korolac Dipping Tank

for electroplating racks in practically all kinds of service.

Korolac is applied by immersing the rack in the liquid. The resultant coating holds its position because the Korolac shrinks on cooling. The coating formed is translucent, corrosion-resisting, tough, inert and possesses high dielectric resistance. Because it is very tough and elastic, the film is subject to damage only by severe physical abuse. If the film is broken it can be easily repaired. One feature to be borne in mind is that it will not adhere to other materials and therefore, cannot be used on plane surfaces.

Korolac is not affected by chrome, nickel, cadmium, zinc, copper, brass or tin plating baths. It also withstands admirably the attacks on alkalies, sulphuric acid, nitric acid, hydrochloric acid, hydrofluoric acid, chromic acid and water which are encountered, both hot and cold in the above plating operations. Plating solutions, even those used for chromium and silver, are not contaminated or fouled by Korolac after it has been thoroughly dried.

The equipment needed for this coating operation will depend upon the size and number of racks to be covered. A special dipping tank is essential in all cases. If a quality of racks are to be coated regularly, a drying oven should also be installed.

The dipping tank should be of a design similar to that shown in Figure 1. The inside container, holding the Korolac, must consist of a vitreous, porcelain, or glass-lined vessel (no other material is satisfactory) which is surrounded by a heating jacket. The space between the Korolac container and the heating jacket is filled with oil to the approximate level shown. The oil used as a heat transfer medium is in turn heated with steam coils. A cover, coated like the heating vessel, is needed to prevent loss of solvent while dipping is not actually going on.

Usually a temperature of 230° to 250°F. is required to bring the Korolac into condition for dipping. It must not be heated in contact with any metal as this results in a chemical change which makes it solidify so that it is unsuitable for further use. This factor accounts for the limited types of materials which are recommended for tank lining. Dipping cold plating racks of any metal does not result in this chemical change due to the fact that the Korolac which comes in contact with the metal itself does not run back into the dipping tank.

Korolac contains a solvent which must be removed between coats and before racks are placed into service. This may be accomplished by drying at room temperature but, due to length of time required, is impractical where a quantity of racks are to be coated. A satisfactory drier can be made of a sheet iron box with sufficient steam coils inside to produce a temperature of 150°F. A suction fan is needed to remove fumes and provide circulation within the oven. Provision also must be made for the proper support of the racks as well as for openings near the bottom to allow fresh air to enter.

Before dipping the racks care should be taken to see that they are free from grease, dirt, salts or loose metal. They should have no sharp edges or corners and all re-entrant angles should be filled. Racks not meeting these requirements can be coated but the length of service of the coating will be decreased. The coating on sharp edges will be much thinner than on the remainder of the rack and as Korolac shrinks upon cooling and drying, the coating will be under strain at the edges which usually receive the greatest wear. It is therefore recommended that round stock be used in making plating racks.

The actual dipping operation, as shown in Figure 2, is quite simple and can be handled by an ordinary workman after a few brief instructions. The rack at room temperature is lowered into the hot Korolac by means of a rope and pulley and immediately removed at a slow, steady rate. Simple racks can be removed quite rapidly while those of more complicated construction, which tend to bridge, must be removed at a slower rate. The excess liquid drips for a few seconds and then chills sufficiently to become jelly-like. As soon as the dripping stops, the stringers which form can be pulled off and the liquid inside the stringers will heal the break. In some cases it is more economical to leave these stringers on the rack until after the final dip when they may be removed with scissors.

Standard practice is to apply four coats of Korolac which usually results in a film thickness of .005" to .012". This variation is due to several factors. Thick metal takes longer to heat up than thin metal and as a result more Korolac chills on the former. Small diameter rods permit the liquid Korolac to run off quicker than large rods,

Fig. 2. Dipping Operation

and therefore, the coating is much thinner.

If racks are to be dried at room temperature they should be held for four to eight hours between coats, depending on the temperature, and after the last coat they should stand until no odor of solvent remains before being put into service. When dried in an oven at 150°F. they should be left in forty-five minutes between coats and eight hours or more after the last coat before going into service. The racks should be allowed to reach room temperature before being dipped each time.

During the dipping process contact points may be protected by covering each of them with a short piece of rubber tubing as shown in Figure 3, which is easily removed after the coating is applied. Some prefer to let the Korolac cover the contacts until after the final coat is applied, then circle a sharp knife around them and peel the film off.

Korolac covered racks which have developed breaks in the film due to mechanical abuse may be repaired by redipping the entire rack or by daubing the break with the material. The latter operation is done by holding a brush, putty knife or stick in the hot material until it has had time to reach the same temperature, then apply in a band around the part where the break has occurred. Korolac will stick to itself by this daubing method but cannot be applied to metal directly in this manner due to the fact that it does not adhere to the metal but merely slides over it.

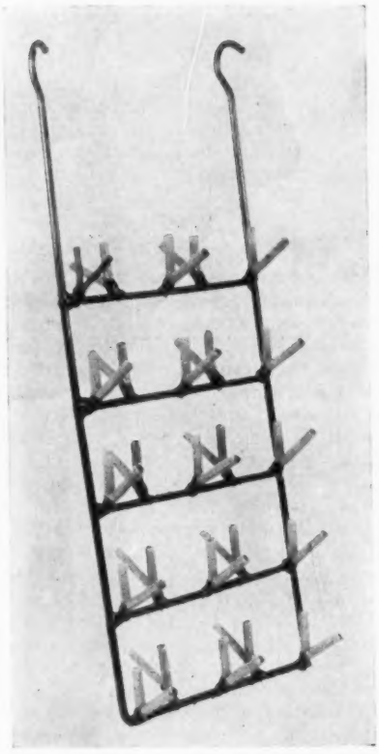


Fig. 3. Rack with Contact Points Protected with Rubber

The cost of the necessary equipment and coating material, as mentioned above, is not excessive in view of the savings which accrue to the user due to the prolonged life of the racks.

New Bright Nickel Process

Weisberg & Greenwald, Inc., 71 W. 45th Street, New York, announce that they are licensing a new bright nickel process which they have developed. A number of installations are already in operation, plating on brass, steel, and zinc base die castings.

A distinguishing feature of this bright nickel solution is the fact that the deposit contains some cobalt. In operation, this cobalt is supplied from the anodes, for which reason special cobalt-nickel anodes are used.

The addition of cobalt to the nickel deposit is not all that is required to convert an ordinary nickel solution into one that produces bright plate. The brightening agents employed in the Weisberg & Greenwald solution are definite chemicals which are commonly available in pure form and the amount of which in solution can be determined by simple and rapid methods of analysis. The solution can therefore be operated under complete chemical control, which eliminates guesswork and rule-of-the-thumb methods. Licensees who have facilities for chemical analysis receive all the necessary instructions to control their own solutions, while for licensees lacking such facilities, Weisberg & Greenwald, Inc. provide adequate service without any additional charge.

The deposits produced from this solution are said to have a mirror-like brightness; the brightness increases with the thickness of the deposit. This, it is stated, sometimes results in covering up minor imperfections in the base metal to a considerable extent. This statement may seem surprising to those who think that an electrodeposit invariably reproduces the surface underneath, but it is stated as a fact nevertheless. If the base metal has a satin finish, the satin finish tends to disappear under a deposit of only 0.0005 inch. This smoothingout effect, of course, does not cover up deep scratches or imperfections. On the contrary, the mirror-like quality of the surface produced from this solution shows up such scratches in the same way as brilliant chromium.

The color of the deposit is said to be whiter than ordinary nickel. The effect of the cobalt is to produce a color that is less yellow than ordinary nickel and less blue than chromium. Although the color is attractive, it tarnishes, like nickel, although more slowly.

The solution is operated warm. For most purposes, current densities between 40 and 60 amperes per square foot are recommended, although there is considerable leeway in the bright plating range both above and below these limits. Bright plate 0.010" in thickness or more can be obtained without burning or treeing. A burn in this solution takes the form of a cloudy deposit, which can usually be covered over by simply plating for a short time at the proper current density. The solution is believed to be absolutely non-pitting so long as the composition is kept within the prescribed limits, the work properly cleaned, and dirt kept out of the solution.

An interesting observation has been made with respect to "double-plating." As every plater knows, double plate may be a serious cause of trouble when plating in ordinary nickel solutions. It is claimed that this bright plating solution can be used to put one deposit over another without the least trouble from poor adherence, even when the nickel serves as an undercoating.

The most notable feature claimed for the deposits from the Weisberg & Greenwald bright nickel solution is their ductility. They are said to compare favorably in this respect with the best dull nickel deposits of similar thickness, and in fact to be used to plate sheets which are stamped and formed subsequent to plating. These deposits to withstand swaging and other severe mechanical operations. For example, pieces of steel plated with this bright nickel and then with chromium can be bent back and forth until the steel is broken, without the plate coming off the steel before it breaks.

An interesting use of this process is being made in plating zinc base die castings. After buffing the castings, they are plated with 0.0003" of copper and 0.0007" of bright nickel. The nickel is followed by chromium. With a little attention to keeping the copper smooth and fine grained, no buffing is necessary after the copper or the nickel.

This solution has been used in a limited way for barrel plating, and further development work is being carried on in testing out different kinds of work in the barrel as well as studying the proper design of the barrel itself.

Up to the present time, Weisberg & Greenwald, Inc. have installed only a limited number of these solutions and have kept them under close observation to make sure there would be no unforeseen difficulties in going from the laboratory to full plant size operation. These plants have now been in operation long enough, they feel, to justify them in offering the process to the general public. In order to facilitate the introduction of the process and to provide a service organization functioning in the principal plating centres of the country, the Hanson-Van Winkle-Munning Company, Matawan, N. J., have been designated sole representatives in the United States. Licenses are issued directly by Weisberg & Greenwald, Inc. This arrangement assures licensees of the combined facilities of both organizations.

In Canada, licenses are granted through Canadian Hanson & Van Winkle Company, Limited, Toronto.

Bright Nickel and Chromium Solutions

The Nickel and Chromium Products Company, 250 Park Avenue, New York, announces that it is marketing a new type of bright nickel solution and also chromium salts. These products are manufactured by Coleman and Appleby, Ltd., Birmingham, England, and the Nickel and Chromium Products Company is the sole agent for the United States and Canada.

Bright Nickel

The bright nickel salts are known as "Starbright." It is claimed that products plated by the use of this material require no buffing, that the plate is soft and malleable and easily covered with chromium.

Starbright must be dissolved in boiling water, 2¼ lbs. of the salt being required per gallon of water. The density must be 17 to 18 degrees Beaume, and the pH value adjusted (with plastic nickel carbonate preferably or .880 ammonia whilst still hot) to 5.6-5.8, before working, and the solution worked at 85 degrees Fahrenheit and agitated. The voltage should be 1½-2½ volts, depending upon the load; the maximum current density, 12 amps per square foot.

Use electrolytic anodes—99.9%. Refresh the bath when necessary by equal additions of single nickel salts and Starbright Refreshing Nickel Salts. Additions are made only when the density of the solution gets below 17-18 degrees Beaume.

If the bath is acid, i.e., pH below 5.6, then the deposit becomes brittle and strips. Rectify by the addition of nickel carbonate, **NOT AMMONIA.** Ammonia causes blackening of deposit.

If the bath is alkaline, i.e., pH above 6.0, the deposit darkens, becomes brittle and strips. Rectify by addition of sulphuric acid (4 to 5 fluid ozs. per 300 gallons).

Bright Chromium Salts

For the chromium salts, the plating time is from 30 seconds to 10 minutes. It is said that the throwing power is unusually good. It is also stated that the chromium solution does not infringe any of the existing patents covering other processes.

The "C & A Bright Chrome" salts are dissolved in warm water, 3¼ lbs. of salts being used for gallon of water. The density being 52 to 54 degrees Twaddell. The solution must not come in contact with iron during the process of dissolving. The chromium tank must be lined with antimonial lead and reinforced glass. The working temperature of the solution is 80 to 85 degrees F. Antimonial lead anodes are used. Voltage, from 2¾ to 4½ volts, depending upon the type of work.

Best results are obtained on a freshly deposited nickel surface of 0.001" thick, which has been well-finished. All work before finishing must be wiped with a lime cloth, before entering the chrome solution. A current of 2 volts should be on the terminals when the work is connected to the negative rod, and the work allowed to remain in the solution for 5 seconds before increasing the current, to allow it to attain the temperature of the solution.

Bright Zinc Plating

Insofar as rust protection is concerned, zinc is recognized as equal to, and in some cases, better than cadmium. The wide application of zinc plating has been delayed, however, by the lack of a dependable plating method which would give a finish that was bright, rather than white, and which would be easy to maintain.

The Mazic Process of Bright Zinc Plating, developed by the Hanson-Van Winkle-Munning Company of Matawan, N. J., it is claimed, permits heavy deposits from a cyanide solution, and gives satisfactory results in still tank, semi-automatic and full automatic plating systems. The plate is said to be truly bright, comparing favorably with the best cadmium finishes.

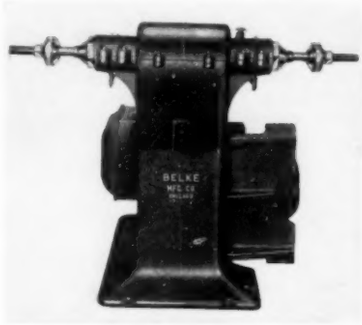
Solutions are easy to maintain, it is stated, and the high cathode current density permissible in the Mazic Solution makes this a high speed plating bath.

Only Mazic Anodes, made from a special alloy, can be used in the Mazic Solution and tanks should be of unlined steel.

Polishing and Buffing Lathes

The Belke Manufacturing Company, 947 N. Cicero Avenue, Chicago, Ill., is offering a new line of buffing and polishing lathes for the metal finishing industries. These lathes feature economy, long-life, low cost of maintenance and freedom from trouble.

Among the special features are the following: oversize, one piece shaft; multi-"V" belt drive; rigid goose neck pedestal; ball bearings running in a bath of oil.



Belke Lathe

The company also supplies an economical belt driven unit.

Catalogs

Lead Burning, Metal Spraying, Compound Linings. Heil & Company, 3088 W. 106th Street, Cleveland, Ohio. (509)

Maintenance Department. A report recently issued by the Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York. (510)

Nineteenth Annual Report of the National Industrial Conference Board, 247 Park Avenue, New York. (511)

Nails. A textbook and catalog. Angell Nail and Chaplet Company, 4580 E. 71st Street, Cleveland, Ohio. (512)

Flexlock Pipe Joints. Bulletin 901 and additional pages. U. S. Stoneware Company, Akron, Ohio. (513)

Your Rights Under the Constitution. United Engineering and Foundry Company, Pittsburgh, Pa. (514)

The American Line. An illustrated folder, describing briefly the various types of equipment made by the American Foundry Equipment Company, 408 Byrkit Street, Mishawaka, Ind. (515)

Paints, Varnishes, Lacquers. A series of technical bulletins with the following titles: No. 1. Synthetic Enamels; No. 2. Some Inside Facts About Lacquer; No. 3. Lacquer Ailments and Solvents; No. 4. Why Lacquer? No. 5. Decorative and Novelty Finishes; No. 6. Art for the Finisher. Benjamin Franklin Paint and Varnish Company, 4820 Langdon Street, Philadelphia, Pa. (516)

Non-Sparking Tool Catalog No. 20,-001-1. Superheater Company, 60 E. 42nd Street, New York City. (517)

Bearing Bronzes. An informative booklet issued by Copper Development Association, Thames House, Millbank, London, S. W. 1, England. (518)

Tune In for Lower Process Costs. A folder which briefly describes the features of the Brown Air Operated Controllers. Brown Instrument Company, Philadelphia, Pa. (519)

Buffing and Polishing Wheels and Compositions. A catalog, neatly indexed and arranged with full information about the line manufactured by Matchless Metal Polish Company, 726 Bloomfield Avenue, Glen Ridge, N. J. (520)

Matchless Liquid Rouge. A new metal polish. Matchless Metal Polish Company, 726 Bloomfield Avenue, Glen Ridge, N. J. (521)

Electrical Measuring Instruments for Research, Teaching and Testing. Broadside E., Leeds & Northrup Company, 4920 Stenton Avenue, Philadelphia, Pa. (522)

Equipment Modernization. The keynote to Foundry Profits. A letter telling about the method of financing the purchase of new equipment under the Federal Housing Administration Plan. American Foundry Equipment Company, Inc., 401 Byrkit Street, Mishawaka, Ind. (523)

Wide-Strip Pyrometer. Bulletin No. 439. Bristol Company, Waterbury, Conn. (524)

Debasing the Currency. By E. S. Pillsbury, President, Century Electric Company, St. Louis, Mo. (525)

Technical Books Catalog No. 3, listing over 1,300 domestic and foreign technical books of publishers. Chemical Publishing Company 175 5th Avenue, New York. (526)

Business Industry and Taxation. A speech by Lewis H. Brown, President, Johns-Manville Corporation, 22 E. 40th Street, New York. (527)

A Trip Through the Most Modern Arc Welder Factory in the World. The Hobart Brothers Company, Box DM 366, Troy, Ohio. (528)

Pangborn Blast Cleaning and Dust Collecting Equipment. Pangborn Corporation, Hagerstown, Md. (529)

Training Supervisors and Key-Men. An outline of the practices of 85 companies. Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York. (530)

Modern Melting. A handbook for those concerned with foundry and high temperature process melting. Detroit Electric Furnace Company, 825 W. Elizabeth Street, Detroit, Mich. (531)

Economic Pitfalls in the Federal Social Security Act. No. 14 in a series of booklet editorials by Allen W. Rucker in collaboration with N. W. Pickering, President, Farrel-Birmingham Company, Inc., Ansonia, Conn. (532)

Steam Turbines for Mechanical Drive. General Electric Company, Schenectady, N. Y. (533)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

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I wish to receive the following catalogs mentioned in January, 1936

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Associations and Societies

Institute of Metals

29 W. 39th Street, New York, N. Y.

The Institute of Metals Division, A.I.M.E., announces the following nominees for officers for 1936:

E. H. Dix, for Chairman.
Albert J. Phillips, for Vice-Chairman.
Robert F. Mehl, for Vice-Chairman.
E. M. Wise, for Secretary.
William H. Finkeldey, Executive Committee for 3 years.
Cyril Stanley Smith for Executive Committee for 3 years.
Lysel Zickrick for Executive Committee for 3 years.

The Division will hold its regular winter meeting in New York, February 17-21, 1936, at 29 West 39th Street. The preliminary list of papers scheduled is as follows:

Metallography

The Coefficient of Equivalence of Iron with Respect to Aluminum in Aluminum Bronze, by J. L. Bray, M. E. Carruthers and R. H. Heyer.

Microscopic Study of Ancient Bronze and Copper, by C. G. Fink and E. P. Polushkin.

Creep and Twinning in Zinc Single Crystals, by Richard F. Miller.

Aluminum

Equilibrium Relationships in Aluminum-zinc Alloys of High Purity, by W. L. Fink and L. A. Willey.

Diffusion of Magnesium and Silicon into Aluminum, by H. R. Freche.

Density Changes in Solid Aluminum Alloys, by L. W. Kempf and H L. Hopkins.

Equilibrium Relation in Aluminum-magnesium Silicide Alloy Containing Excess Magnesium, by F. Keller and C. M. Craighead.

Theoretical Metallurgy

Precipitation Hardening in Aluminum-base Alloys, by W. L. Fink and D. W. Smith.

Age-hardening of Magnesium-aluminum Alloys, by A. M. Talbot and J. T. Norton.

Theory of Metallic Crystal Aggregates, by C. G. Maier.

Diffusion in Solid Metals. Annual Lecture of the Division, by R. F. Mehl.

Symposium: The Role of Metals in New Transportation.

Address by A. J. Pelley.

The Heavier Nonferrous Metals in Transportation, by C. H. Mathewson.

Light-weight Metals in the Transportation Industry, by Zay Jeffries.

American Foundrymen's Association

222 W. Adams Street, Chicago, Ill.

Large attendance at the recent National Metals and Machine Tool shows, that broke previous records for these events, has focused attention of manufacturers of industrial equipment on the interest that is being displayed throughout all industries in the developments and improvements in machinery, equipment, and materials. Similar interest and large attendance are anticipated at the coming 40th Annual A.F.A. Convention—Foundry and Allied Industries Exposition to be held in Convention Hall, Detroit, May 4 to 9, 1936.

Accordingly, plans are being made for one of the largest displays of equipment, materials and supplies for the foundry and allied industries in the history of the Association. With 166,000 sq. ft. of floor space available and excellent facilities for an unlimited operating exhibit, Convention Hall, within a few minutes of the hotel district, is an ideal location for this event.

Tentative schedule of events calls for registration, plant visitation and committee meetings on Monday, May 4, and Formal Opening of the Exposition at 9:00 a.m., Tuesday, May 5, with final closing 4:00 p.m., Saturday, May 9. Open hours for the exhibit have been set tentatively for 9:00 a.m. to 6:00 p.m. daily. Saturday will be **Detroit Day** and plans are under way to make it the feature exhibition day of the week.

Even as great progress has been made in foundry technique and in increasing the physical properties of cast metals, so have similar strides been made in the equipment field. All types of foundry

equipment, materials and supplies have been greatly improved during the depression years. In some instances, new types of equipment have been evolved that have revolutionized certain foundry processes.

The exhibit of Foundry materials, supplies and equipment to be held in Convention Hall, Detroit, May 5 to 9, will give those interested in the manufacture of castings an opportunity to view these new and improved materials and supplies and to see the most up-to-date equipment in operation.

Connecticut Non-Ferrous Foundrymen's Association

c/o L. G. Tarantino, 523 W. Taft Ave. Bridgeport, Conn.

At our meeting held Dec. 17th, 1935, at the Hotel Garde in New Haven, Conn., we had as speaker for our technical session R. J. Heisserman, an Engineer of the Link-Belt Company of Philadelphia who gave us an illustrated lecture on "Equipment Applied to the Non-Ferrous Foundry."

We held our annual election of officers for 1936 as follows:

President: T. Joseph Judge, The Jenkins Brothers Company, Bridgeport, Conn.

Vice-President: H. Q. Phelps, The Phelps Foundry Company, Ansonia, Conn.

Treasurer: D. Wesley Case, The Belknap Manufacturing Co., Bridgeport, Conn.—re-elected.

Secretary: Louis G. Tarantino, 523 W. Taft Ave., Bridgeport, Conn.—re-elected.

Technician: Harold King, The Jenkins Brothers Company, Bridgeport, Conn.

Chairman, Executive Committee: David Tamor, Reading, Pratt & Cady Company, Hartford, Conn.

Member, Executive Committee: Ernest Stone, Consolidated, Ashcroft Hancock Company, Bridgeport, Conn.

Member, Executive Committee: Fred Clarke, Whitehead Brothers Company, Providence, R. I.

Member, Executive Committee: Geo. King, Malleable Iron Fittings Company, Branford, Conn.

Member, Executive Committee: J. F. Halpin, Seymour Manufacturing Company, Seymour, Conn.

Our next meeting will be held Jan. 21st, 1936, at the Hotel Garde, in New Haven, Conn. Our technical session will be a "Round Table Discussion on Phosphor Bronze."—L. G. Tarantino.

American Electro-Platers' Society

Care E. Steen Thompson, 905 W. 10th Street, Erie, Pa.

The 1935 Convention of the American Electro-Platers' Society was indeed a success, many thanks to **Metal Industry** and other friends that contributed such wonderful support.

The Bridgeport Branch donated as follows:

Supreme Society (A.E.S.)	$250.00
Research Fund	300.00
Monthly Review	250.00
Convention Secretary	200.00

Each Committee Chairman received a wrist watch and a check for $20.00.

St. Louis Branch, A.E.S.

c/o H. H. Williams, 3153 Watson Rd.

The St. Louis Branch of the American Electro-Platers' Society will hold its annual open meeting and banquet on February 1, 1936. The educational session will begin at 3 P. M. One of the important papers of the session will be delivered by Dr. L. E. Stout of Washington University. E. J. Musick, chairman of the committee in charge of the meeting can be reached at 206 S. Sixth Street, St. Louis.

The banquet will begin at 6:30 P. M., to be followed by a dance. The entire meeting will be held at the York Hotel, formerly the American Annex.

Mid-West Platers Association

7320 Hamilton Ave., Detroit, Mich.

A General Meeting of the Master Electro-Platers Association of the Mid-West, was held at the Sinton Hotel, Cincinnati, Ohio, from 11:00 a.m., Saturday, December 14, to 12:00 noon, Sunday, December 15, 1935. The Program included the following features:

Saturday, December 14

1:30 p.m-3:30 p.m.—**"Management"**—C. D. Cleaver, Assistant Factory Manager, The Guide Lamp Corporation.

Report on Testing Project.

Estimating Project—Quoting from a Blue Print.

"The Importance of Quality Plate and the Necessity for Technical Control from the Customers' Viewpoint"—C. C. Conley, National Cash Register.

7:30 p.m.-9:30 p.m.—**Federal Social Security Act**—B. Reed, Manager, Industrial Department, Cincinnati Chamber of Commerce.

Report of Wage Survey, Compensation Survey, Power, Water and Taxes Survey.

Estimating Project—Quoting from Sample Parts.

"A Plan for Accrediting Job Shops", —M. M. Wise, President, Master Electro-Platers' Institute.

Sunday, December 15

9:30 a.m.-12:00 noon—**Quoting Project** —Report covering actual known costs and operations upon a quantity production of parts, blueprint and samples of which were submitted at Second and Fourth Sessions for estimation.

"Testing Methods"—Dr. F. C. Broeman, Consulting Chemical Engineer.

Those present took the following action, unanimously and without a single dissenting vote:

(1) Continuation of the organization with present officers and Executive Committee, till June 30, 1936.

(2) Continuation of the program of meetings, concentrating for the next three months upon our cost problems, with actual demonstrations of the cost of plating certain articles by members, who have plated the articles.

(3) Continuation of the field service work with attention given particularly to base metal problems, Power, Water and Compensation costs, and to methods of controlling costs in each member shop.

(4) The Institute's tentative suggestions for accrediting shops to be given further consideration at the next Quarterly Meeting to be held in Toledo, March 28th and 29th.

(5) The same rate of contribution, 2/5 of 1%, was unanimously adopted. The contribution to be based upon 1935 volume. As 1935 volume will not be determinable till after the first of the year, it was voted unanimously to pay immediately a sum equal to 1½ months dues on the old basis, that is, 1934 volume, to be credited upon 1936 contributions.

(6) The twenty-four shops present all agreed to make such 1½ months payment immediately upon return to their cities. The Secretary was authorized to notify the absent members regarding these decisions and to send all members a membership notice, and explanation of the action taken.

(7) The report that 98% of the members had paid their 1935 contributions in full, was strongly applauded.

American Welding Society

33 West 39th Street, New York, N. Y.

Proposed Uniform Test Procedure for the Qualification of Operators of Welding Equipment

In the development of fusion welding applications, progress has been made only by offering to the user definite assurance of the integrity of the welds. The most positive determination for this is, of course, the non-destructive exploration or test, of the welded joint, but where that form of test does not appear to be warranted, the plan of qualifying the welding operator by tests of welds made by him is, by common consent, regarded as the most effective safeguard for weld quality. A Committee of the American Welding Society has been appointed to correlate the requirements of existing codes relating to tests of welding operators.

The Committee expects, in the near future, to submit the proposed procedure as a tentative set of rules for publication, whereupon general criticisms thereof will be invited.

Personals

Jerome Strauss

Jerome Strauss, who recently was elected vice-president in charge of research and development for the Vanadium Corporation of America, has been affiliated with the company for the past seven years.

He is a graduate of Stevens Institute of Technology with a degree in mechanical engineering. Following college Mr. Strauss went with the Illinois Steel

JEROME STRAUSS

Company at the South Chicago works, his stay there being from 1913 to 1914.

In 1914, and until 1917, he was identified with the Western Drop Forge Company as chemist and metallurgist. Following, during the World War from 1917 to 1919, Mr. Strauss was commissioned in the United States Army, serving the Ordnance Department in various capacities. In 1919 he was named chief chemist and later materials engineer for the United States Naval Gun Factory at Washington.

In 1928 Mr. Strauss went with the Vanadium Corporation as chief research engineer, a post he has held until his recent election to the vice-presidency.

Mr. Strauss' numerous society affiliations include the vice-chairmanship of the Pittsburgh chapter of the American Society for Metals; position of chairman of the Non-ferrous Division of the American Foundrymen's Association; chairmanship of committee A-10 on Iron-Chromium and Iron-Chromium-Nickel Alloys of the A.S.T.M.; and membership on the Iron Alloys Research Committee of the Engineering Foundation.

Mr. Strauss holds a commission of Lieutenant Commander in the United States Naval Reserve.

John L. Christie, chief metallurgist, Bridgeport Brass Company, Bridgeport, Conn., has been nominated for Director of the American Institute of Mining and Metallurgical Engineers. Mr. Christie is an active member of the Institute of Metals Division of the A.I.M.E.

The talk by **George B. Hogaboom** for the New York Branch of the American Electro-Platers' Society which was scheduled to be held on December 27, 1935, was postponed to January 24, 1936. The subject will be "What Is Under the Plate?" On February 5, Mr. Hogaboom, will speak before the Industrial Executives Association in Jackson, Mich. The subject will be the Principles of Electroplating.

Wilbur H. Bachman, a graduate of Ohio State University has recently joined the staff of Battelle Memorial Institute. Mr. Bachman has been assigned to the Division of Physical Metallurgy at Battelle.

Joel C. Carpenter has joined the technical staff of Battelle Memorial Institute. Mr. Carpenter since his graduation from Case School in 1929 has been engaged in non-ferrous metallurgical research, principally in the plants of the Chase Brass and Copper Company. He has been assigned to the division of Process Metallurgy at Battelle.

Obituaries

Blaise Panzeri

Blaise Panzeri, head of the firm of B. Panzeri Sons, electroplaters, 706 Royal Street, New Orleans, La., died October 15, 1935. The business is being continued by his son Louis Panzeri.

Cloyde Hauk

Cloyde Hauk, production development engineer, Osborn Manufacturing Company, Cleveland, Ohio, died December 13, aged 51 years. He had been connected with the company for more than 20 years.

E. H. Cummings

E. H. Cummings died recently from a heart ailment, at his residence, 21 Grant Street, Attleboro Falls, Mass. A native of Attleboro, Mr. Cummings came to North Attleboro about thirty years ago. He learned the jewelry industry thoroughly and became a member of the firm of the Standard Chain Company a number of years ago, and was largely instrumental in bringing the industry to this town from Providence. He served as president of the Manufacturing Jewelers' Board of Trade in Providence and also as a director in the New England Manufacturing Jewelers and Silversmiths association.

He is survived by his widow, Mrs. Josephine Cummings, a son, Edwin H., Jr., and a daughter, Mrs. Horace Gowen of Attleboro. He also leaves two granddaughters. He was an active member of the Universalist church.

Leslie E. Hooker

Leslie E. Hooker, who invented a process for the manufacture of metal tubing that revolutionized that industry and proved an important factor in the manufacture of such articles as cartridges and automobile radiator tubing, died recently. He was 78 years old.

Mr. Hooker's principal invention, known as the extrusion process, consisted of pressing the metal through a ring-shaped opening instead of drawing it to form the tubing. Mr. Hooker was at one time general manager of the Metallic Sheet and Tube Company of Pawtucket, R. I.

His wife, Mrs. Cora E. Lamb Hooker, a daughter, Mrs. C. A. Miller, and a son, Ross E. Hooker, survive.

August Salomon

August Salomon, founder and president of the Republic Metals Corporation, 273 Greene Street, Brooklyn, N. Y., died recently of pneumonia at his residence, the Hotel Park Royal, 23 W. 73rd Street, New York, at the age of 68. His widow, the former Emily Haas; two sons, Leister and Morton and a daughter, Elizabeth, survive. Born in the Duchy of Luxemburg, Mr. Salomon came to the United States in 1885. He spent his entire career in the metal industry, starting as a clerk.

Mr. Salomon was an active member of the Federation for the Support of Jewish Philanthropic Societies.

Charles T. Myers

Charles T. Myers, 52, Savage Arms Corporation official, died November 15 in Utica. He was the corporation cost engineer. A native of Philadelphia, after graduation from Drexel Institute, he was first employed by the Philadelphia Rapid Transit Company. He was connected with Westinghouse in the manufacture of their first tungsten lamps coming to Utica in 1917. Mr. Myers served as works engineer and was at one time treasurer. In 1930 he was in charge of moving the A. H. Fox Gun Company from Philadelphia into the Savage plant at Utica.—E. K. B.

Charles Henry Krueger

Charles Henry Krueger of 538 First Street, Brooklyn, New York, aged 56, died Friday, December 6, at the Methodist Episcopal Hospital in Brooklyn, New York. Mr. Krueger had been ill since the middle of September. He was a vice-president and director of the Chase Brass & Copper Company, Waterbury, Conn., and particularly in charge of the Chase warehouse system. He was also treasurer of the Copper and Brass Warehouse Distributors' Association and well known in the industry throughout the country.

Mr. Krueger was born on June 30, 1879, and for many years was associated with Patterson, Gottfried and Hunter, hardware distributors, and during the later years of his connection with that concern was treasurer. He left that company in 1908 to join the U. T. Hungerford Brass & Copper Company, of which he became the vice-president and general manager.

When that concern was merged with the Chase Brass & Copper Company in 1927, he was made a vice-president of the latter company and continued as the active head of both Chase and Hungerford warehouses, which position he held at the time of his death.

Mr. Krueger leaves his wife and two sons, Charles G. Krueger and Dean W. Krueger.

Morris Hunt Bennett

Morris Hunt Bennett, electrical engineer and inventor of electrical devices employed by the Scovill Manufacturing Company died Oct. 28. He was born in Columbia, Penn., the son of Charles and Edwina (Hunt) Bennett in September, 1888. He was associated with the Edison Electric Co. of Brooklyn, N. Y., from 1908 to 1913, then coming to the Scovill Company as electrical engineer. He early developed the Bennett Compact Resistance furnace on the electric arc system for brass melting and was responsible for the development of the high temperature pyrotechnic control now in use in the company's casting shops. Besides being superintendent of the company's electrical transmission system he was in charge of the electrical research laboratory. He had much to do with the electric motor development for such small units as phonographs and vacuum cleaners, condensers and eliminators in radios. He worked in close correspondence with such electrical consultants as Clifford of Harvard and Mathewson of Yale. President E. O. Goss of the Scovill Company said he had never known a man, coming as Mr. Bennett did, wholly new from outside, to develop an effective cooperation with the plant as quickly and happily as he had done.

He was a member of St. John's Episcopal church, the Masons, the American Institute of Electrical Engineers and the American Radio Institute. He is survived by his wife, Mrs. Clara E. (Harrison) Bennett; two daughters, Georgia and Susanne Bennett of this city and a brother, Charles E. Bennett of Ridgefield, N. J. The funeral was held Oct. 31, Rev. Dr. John N. Lewis officiating.—**W. R. B.**

J. J. Sommer

John Jacob Sommer, 79, prominent manufacturing jeweler, died December 17, 1935, at his home, 107 Church Street, North Attleboro, Mass., after a long illness. He came to North Attleboro in 1877 as a salesman for the Thomas Totten Company, which he later purchased and conducted as the J. J. Sommer Company.

Mr. Sommer was prominent in Masonic circles, being a member of Bristol lodge, A.F. and A.M., Radboni Chapter of this community and Bristol Commandery, Knight Templars of Attleboro. He is survived by a daughter, Mrs. Ruth Wilkin and a son, Edmund T. Sommer of California.

Frederick W. Hicks

Frederick W. Hicks, since 1919 works manager of the McCord Radiator & Manufacturing Company, Detroit, suffered a heart attack on Dec. 15 while attending a football game at the University of Detroit Stadium and died while being taken to a hospital. He was 56.

Born in Britanny, France, Mr. Hicks was the son of Welsh parents who had gone to France from Cardiff. Later they came to the United States. During the World War Mr. Hicks was general superintendent of the Eddystone Rifle plant at Chester, Pa., and before that had been a shop superintendent of the Baldwin Locomotive Works, also at Chester.

Charles L. Hodgson

Charles L. Hodgson, 48, vice president and superintendent of the Doehler Die Casting Company, Batavia plant, died suddenly on the night of December 29th of a heart attack.

Mr. Hodgson had always been prominent in the civic life of Batavia. He was president of the Batavia Club, the Batavia Chamber of Commerce and a member of numerous other organizations.

He leaves a widow and three sons.

John William Pilling

John William Pilling, President and Treasurer of the Baltimore Brass Company, Baltimore, Md., died on December 29th in Baltimore. An extended biography will appear in February.

Necrology

Among the men of prominence in the metal industries who passed away during 1935 were the following:

John T. Baker, Chairman of the Board, J. T. Baker Chemical Company, No. Phillipsburg, N. J.

Charles W. Henger, formerly Vice-President, Chase Companies, Waterbury, Conn.

Henry S. Wardner, Treasurer and General Counsel, New Jersey Zinc Company, 160 Front Street, New York.

Charles Bauer, Secretary and General Manager, T. E. Conklin Brass and Copper Company, 54 Lafayette Street, New York.

Samuel Moore, formerly President, Samuel Moore and Company, 301 Friendship Street, Providence, R. I.

C. D. Armstrong, formerly President, Armstrong Cork Company, Lancaster, Pa.

George W. Cooper, former Advertising Manager, **Metal Industry,** 116 John Street, New York.

Edgar F. Price, Vice-President, Union Carbide and Carbon Corporation, 30 E. 42nd Street, New York.

Clifford R. Gardinor, President, International Silver Company, Meriden, Conn.

Maynard S. Melville, Works Manager, Benedict Manufacturing Company, E. Syracuse, N. Y.

John T. Seaman, President, Sea-Thor Brass Foundry Company, Milwaukee, Wisc.

Sidney K. Becker, Works Manager, U. S. Aluminum Company, Fairfield, Conn.

Henry F. Wanning, Director, Farrel-Birmingham Company, Ansonia, Conn.

Alexander Harper, President Bristol Brass Corporation, Bristol, Conn.

B. F. Mueller, Vice-President, Mueller Brass Company, Port Huron, Mich.

Edward C. Miller, President, Magnolia Metal Company, Elizabeth, N. J.

Edward A. Colby, Secretary, Baker and Company, Newark, N. J.

J. L. Oberdorfer, formerly Treasurer, M. L. Oberdorfer Brass Company, Syracuse, N. Y.

George W. Dover, Vice-President, Drapery Hardware Manufacturing Company, Providence, R. I.

Charles Fell, formerly General Manager of the Lorain, Ohio, plant of the National Tube Company.

Eugene R. Grasselli, Grasselli Chemical Company, Cleveland, Ohio.

George C. Stone, formerly Consulting Engineer, N. J. Zinc Company, 160 Front Street, New York.

B. H. Johnson, Assistant to the President, R. D. Wood Company, Philadelphia, Pa.

Morris Hunt Bennett, Scovill Manufacturing Company, Waterburg, Conn.

Leslie E. Hooker, inventor of the extrusion process for tube manufacture, San Mateo, Fla.

Charles H. Krueger, Vice-President, Chase Brass and Copper Company, Waterbury, Conn.

Frederick W. Hicks, works manager, McCord Radiator & Manufacturing Company, Detroit, Mich.

Charles L. Hodgson, vice-president and superintendent, Doehler Die Casting Company, Batavia, N. Y.

Metal Developments

The **General Electric Company,** Schenectady, N. Y., reports a new volume record in the annual sale of both large and miniature incandescent lamps in the United States during 1935. A preliminary estimate indicates a total of 707,000,000 as against the 1929 total of 634,233,000, the previous high.

An **aluminum canoe** has been constructed by oxy-acetylene welding. The hull consists of 10 strips of aluminum extending from one gunwale to the other, welded together at the seams. The hull is reenforced by several cross pieces. The total weight of the canoe is 83 pounds.

Nearly 200,000 pounds of **Monel metal** have been ordered as roofing material for two of New York's important buildings, the Pennsylvania Railroad Terminal and the New York Public Library.

Alloy Metal Wire Company, Inc., Moore, Pa., reports an extraordinarily high response from a recent mailing of a circular letter to present and potential customers. The returns totalled 21 per cent.

Metal foil continues to spread into new fields daily according to the **Reynolds Metals Company,** 19 Rector Street, New York. It is now being used for individual cigar wrappings, cigar box linings and bags for food products of a large variety.

The practice of building up worn or undersized parts of machinery by the use of electrodeposited nickel has become well established in European practice according to a report from the **International Nickel Company,** 67 Wall Street, New York.

Chemical Exposition

The rise of American chemistry and chemical engineering, interpreted through its Exposition of Chemical Industries during the past twenty years, was brought to a new climax this year with the Fifteenth Exposition, held at Grand Central Palace, New York, December 2-7. Two hundred and fifty-seven exhibitors gave visual indication that the American chemical industry is depression proof. At the exposition in 1931, 22,000 were admitted by registration. In 1933 the figure was 33,000. For 1935 the figure has not yet been compiled, but it is estimated to be a big advance over any previous attendance record.

An exposition reflects materials, machines, and men. The American Chemical Society's exhibit this year struck a keynote when it called its industrial protegees, "The Children of Recovery." This exhibit was later shown at Metal Products Exhibits, International Building, Rockefeller Center, New York. Each of the products exhibited was selected by the Society, and the whole group illustrates the essential role played by research in economic affairs. Many of the products pertain to the metal and metal finishing and cleaning fields and among the interesting features of the exhibit were the following:

Metals—Process for electroplating bright zinc on steel, giving a finish that resists rust, tarnish, finger print stains, etc., by **E. I. du Pont de Nemours and Company,** Wilmington, Del.

Sodium-lead and zinc-lead alloys, with 2% sodium and 98% base, used for deoxidizers in brass and bronze manufacture; also by **Du Pont.**

Process for veneering precious metals on various base metals by hot pressing and rolling, combining the chemical resistance of the precious metals with the low cost and mechanical strength of the base; by **General Plate Company,** Attleboro, Mass.

RH 35 resin, resistant to heat, acids and alkalies; by **E. I. du Pont de Nemours and Company,** Wilmington, Del.

For Metal Cleaning—Metso 99, a new soluble silicate; by **Philadelphia Quartz Company,** 123 S. 3rd Street, Philadelphia, Pa.

Nacconols, a group of new detergents; by **National Aniline and Chemical Company,** 40 Rector Street, New York.

Alphasol wetting and emulsifying agents; by **American Cyanamide & Chemical Corporation,** 535 Fifth Ave., New York.

For Metal Finishing and Protection—Non-sanding spraying lacquers, which give smooth finish without sanding; by **Thomas and Hochwald Laboratories,** Dayton, Ohio and **Sharples Solvents Corporation,** 23rd & Westmoreland Street, Philadelphia, Pa.

Hommelaya process of porcelain enameling with a cobalt coating, giving increased depth and capacity with only two firings; by the **O. Hommel Company,** 211 Fourth Ave., Pittsburgh, Pa.

Chromium plated drums, for drum dryers, are now recommended for many chemicals, and especially when drying corrosive solutions which become contaminated by iron.

Metals and Alloys

Metals and alloys were the subject of exhibits by nineteen exhibitors. The metals on display ranged from iron and steel through nickel, copper, and brass, and all of the industrial alloys, to the more precious metals like platinum and rhodium, including an exhibit of rhodium electroplating.

Seamless tantalum tubing was shown by the **Fansteel Metallurgical Corporation,** North Chicago, Ill., in sizes from hypodermic needles up.

Lead was well represented by exhibits of all types of sheet lead, lead pipe fittings, wire, rod, and bar stock, also lead wool from the **National Lead Company,** 111 Broadway, New York. There were numerous examples of lead burning and heating. In the making of tellurium lead, which is virtually pure lead, the tellurium is added in an amount less than 0.1%.

Gold filled ware was demonstrated by the **General Plate Company,** Providence, R. I., in terms of the process of fusing the precious metal on to the base metal and attenuating the result. Silver was thus filled in the original Sheffield plate.

Baker & Company, Newark, N. J., showed an $18,000 trophy made of solid platinum and quartz crystal.

Monel metal, nickel and nickel alloys were to be seen many places about the Chemical Exposition in terms of their applications and also exhibits by the **International Nickel Company,** 67 Wall Street, New York.

Protective coatings and chemical paints of all kinds were represented by many exhibits. Chromodizing was shown by the **American Chemical Paint Company,** Ambler, Pa., to be a process for protecting steel and electrogranidizing was offered as a new method for rust proofing by phosphate coating. There were also treatments to make paint adhere to zinc and cadmium-plated steel and to galvanized iron.

Other exhibitors included the following:

Aluminum Co. of America, Gulf Bldg., Pittsburgh, Pa.

Andrews Lead Co., 30-48 Greenpoint Ave., L. I. City, N. Y.

Bakelite Corp., Bound Brook, N. J.

Bristol Co., Waterbury, Conn.

Brown Instrument Co., Philadelphia, Pa.

Duriron Co., Inc., Box 1019, Dayton, Ohio.

Foxboro Co., Foxboro, Mass.

Garlock Packing Co., Palmyra, N. Y.

General Ceramics Co., 30 Rockefeller Plaza, N. Y.

Haveg Corp., Newark, Dela.

Hellige, Inc., 3702 Northern Blvd., L. I. City, N. Y.

Illinois Testing Laboratories, Inc., 141 W. Austin Ave., Chicago, Ill.

Knight, Maurice A., Akron, Ohio.

Lead Lined Iron Pipe Co., Wakefield, Mass.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Pangborn Corp., Hagerstown, Md.

Quigley Co., 56 W. 45th St., N. Y.

Shriver & Co., T., 823 Hamilton St., Harrison, N. J.

Sumet Corp., 295 Madison Ave., N. Y.

Taylor Instrument Companies, Rochester, N. Y.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

U. S. Stoneware Co., 50 Church St., N. Y.

Vulcan Copper & Supply Co., 120 Sycamore St., Cincinnati, Ohio.

Oakite Holds 27th Year Technical Sales Conference

For four days beginning December 9, 1935, eighty Oakite service men of Oakite Products, Inc. gathered in the headquarters office in New York to discuss metal and other cleaning operations, and exchange ideas on improved methods, and means of lowering cleaning costs.

"The Relation of the Oakite Saturol Method to Metal Cleaning" was the title of an interesting paper read by R. E. Powell, Erie, Pa. In it he described the wide range of work which today can be handled with new ease and economy through the use of this recent development in metal cleaning. A paper on **"Factors that Influence Cleaning Results in Vitreous Enameling Plants"** was read by S. C. Shank of Toledo. Mr. Shank thoroughly covered the influences that determine the economy and effectiveness of cleaning and neutralizing operations, and the steps that should be taken to assure consistent, low-cost results in preparing sheet ware for enameling.

Discussion on these subjects as well as on cleaning before plating and japanning, cleaning parts between operations, rust-proofing work held in stock or in process, stripping paints and other finishes, made the conference both an extremely interesting and informative one.

The convention closed with a banquet at the Hotel Commodore, New York, at which various Oakite representatives were given awards for outstanding work during the current year. **D. C. Ball,** President of Oakite Products, Inc., **Mason Britton,** Vice-President of the McGraw-Hill Publishing Company and **Erik Oberg,** Editor of Machinery spoke of the greater opportunities which exist for all industries in 1936 and particularly for those organizations whose past study and research have prepared them to make a worth-while contribution to even greater industrial efficiency in the coming months.

New Course in Electroplating

Dr. C. B. F. Young, technical director of the U. S. Research Corp., Long Island City, N. Y., will give a new course in electroplating at Columbia University, New York City.

The course will be divided into either one or two semesters both consisting of two 3-hour sessions per week. The new course, Chemical Engineering, E-85, E-86, is called "Investigations of Special Problems in Electroplating."

Each meeting will consist of one-half hour conference and a two and one-half hour laboratory period. The student will be assigned to a special problem at the beginning of the school year and reports concerning the progress will be given to the instructor periodically. This course is designed to give the student an opportunity to do original work in this field.

Only students who are capable and qualified will be admitted.

The practical electroplating course, which has been given at Columbia heretofore will continue. This course is also divided into two 3-hour sessions per week. The first hour will be given over to a lecture concerning the application of modern theories of electrochemistry to electroplating. The balance of the period will be spent in the laboratory, where the student will perform experiments on electroplating baths. This course is known as Chemical Engineering E-84.

These courses will start February 1st, 1936. All electroplaters, buffers, and plant men are invited to investigate these courses.

Holiday Greetings

We acknowledge with thanks receipt of Christmas and New Year Greetings from a number of our friends, among whom are the following:

American Brass Company, Waterbury, Conn.

Dr. A. Kenneth Graham, University of Pennsylvania, Philadelphia, Pa.

George B. Hogaboom, Hanson-Van Winkle-Munning Company, Matawan, N. J.

Wilfred S. McKeon, president, W. A. Fuller Company, Greensburg, Pa.

Charles H. Proctor, Arlington, N. J.

United Engineering and Foundry Company, Pittsburgh, Pa.

Canadian Tariffs Reduced on American Metal Products

Below is a list of some of the American metals and metal products on which Canadian Tariffs have been revised as a result of the new Trade Agreement.

	Present duty	New duty
Lead in bars and sheets	25%	22½%
Manufactures of lead, n.o.p.	30%	27½%
Lead capsules for bottles	30%	27½%
Type of printing, etc.	20%	17½%
Phosphor tin and bronze in blocks, etc.	10%	7½%
Zinc strip, tubing, dust, etc.	Free	Free
Manufactures of zinc, n.o.p.	25%	22½%
Brass bars and rods over 6 ft., brass strips, etc.	15%	10%
Wire of all metals and kinds, n.o.p.	35%	30%
Wire, insulated	30%	27½%
Wire, twisted, etc.	25%	22½%
Wire, cloth, etc.	25%	22½%
Manufacturers of brass or copper, n.o.p.	30%	24¾%
Screws of brass, copper, n.o.p.	35%	30%
(a) Wood screws	35%	30%
(b) Machine and other screws	40%	35%
Coin locks of brass or bronze	30%	27½%
Nickel kitchen or household hollow-ware, n.o.p.	40%	29¾%
Unplated manufactures of German silver, n.o.p.	10%	7½%
Anodes of nickel, zinc, etc.	45%	30%
Electropated ware, n.o.p.	45%	33¾%
Articles of silver, nickel-plated ware, electroplated ware, gold and silver, manufactures	45%	33¾%
Electroplated parts for loose leaf binders	45%	33¾%
Toilet articles of sterling silver	10%	7½%
Composition metal for manufacturing watch cases, etc.	30%	25%
Findings of metal jewelry materials for manufacturing other than gold and silver	25%	20%
Wire or strip, jewelry material	35%-40c	30%-40c
Watches of all kinds, a. v.—min. sp., ea.	15%-10c	15%- 5c
Parts of watch movements, a. v.—min. sp., pl.	45%	45%
Watch cases and parts thereof, fin. or unfin., a. v.	35%-50c	30%-50c
Clocks, cases, movements, etc., a. v.—min. sp., ea.	37½%	30%
Electric dynamos, generators, transformers, n.o.p.	37½%	27%
(ex.) Carbon brushes for dynamos	37½%	30%
Electric motors, n.o.p.	37½%	27%
(ex.) Carbon brushes for motors	27½%	25%
Electric sad irons	30%	25%
Electric apparatus, n.o.p.	30%	25%
Skates of all kinds	30%	27½%
Buckles, clasps, etc. (not jewelry)	30%	27½%
Pins from wire of any metals n.o.p. ad val. and lb.	10c	10c
Corset clasps, etc.	30%	27½%
Slide or hookless fasteners	40%	37½%
Metal parts for manufacturing covered buttons	30%	25%
Frames under 10-in. wide for manufacturing purses, etc.	20%	17½%
Ribs of brass for manufacturing canes, umbrellas, etc.	7½%	5%
Bird, etc., cages, wire and metal parts	30%	25%

Business Items-Verified

Hamilton-Beach Company, Racine, Wis., division of Scovill Manufacturing Company, Waterbury, Conn., and manufacturer of fractional horsepower motors, vacuum cleaners, electric mixers, etc., has plans for an addition, 80 x 150 ft., three stories and basement, adding 36,000 ft. T. B. Myers is vice-president and general manager at Racine. This firm operates the following departments: brass machine shop, tool room, stamping, soldering, plating, polishing, grinding room, lacquering and japanning.

Industrial Chemical Products Company, 3777 Bellevue Avenue, Detroit, Mich., has let contract for a one-story addition. Cost close to $30,000, with equipment. This firm operates the following departments: soldering and brazing.

City Metals Refining Company, formerly at 687 Illinois Street, Detroit, Mich., is occupying a new combined plant and offices at 2945 Hubbard. The new plant has 25,000 sq. ft. of space and provides excellent facilities for both truck and rail shipping, according to Samuel Zeldes, president. The company has installed complete up-to-date equipment for handling all non-ferrous metals, including magnetic separators and white metal smelters. Jacob Zeldes is associated with the company.

Coleman Lamp and Stove Company, 250 N. St. Francis Street, Wichita, Kan., has let general contract for a one-story and basement addition, 50 x 66 ft. Cost about $25,000 with equipment. The following departments are operated: brass machine shop, tool room, cutting-up shop, stamping, zincing, tinning, soldering, brazing, plating, polishing, grinding room, lacquering and japanning.

Noblitt-Sparks Industries, Inc., Columbus, Ind., manufacturer of automotive accessories and equipment has purchased the former plant of Lincoln Chair Company in Columbus. The building will be used for general offices and assembly of automobile heaters and household radios. Work of reconditioning the plant has been started.

Handy Governor Corporation, 3925 W. Fort Street, Detroit, Mich., manufacturer of air cleaners, governors and kindred mechanical products has leased about 20,000 sq. ft. in local plant of Studebaker Corporation, Clark and Jefferson Streets, for plant. The firm operates the following departments: brass machine shop, stamping, soldering and lacquering.

Behr-Manning Corporation, Sidford Street, Troy, N. Y., manufacturer of abrasives, a subsidiary of Norton Company, Worcester, Mass., has let general contract for a three-story addition to main plant at Watervliet, N. Y., 50 x 200 ft. and 50 x 100 ft. Cost close to $175,000 with equipment.

Matchless Metal Polish Company, 838 W. 49th Place, Chicago, Ill., manufacturer of buffing and polishing compositions, metal polishes, and through affiliated company, Advance Polishing Wheels, Inc., a complete line of buffs and polishing wheels, is erecting a two-story addition to plant, 62 x 140 ft. Cost about $40,000 with equipment.

Harry C. Weiskittel Company, Inc., 4901 Philadelphia Road, Baltimore, Md., manufacturer of gas ranges, parts, etc., has let general contract for a one-story addition, 80 x 250 ft. Cost over $85,000 with equipment. This firm operates the following departments: cutting-up shop, stamping.

George V. Clark Company, Inc., 189 Academy Street, Long Island City, N. Y., manufacturer of tin cans and containers, has leased building at 42-26 Thirteenth Street, for new plant. The firm operates the following departments: tool room, stamping and soldering.

Hertner Electric Company, 12600 Elmwood Avenue, Cleveland, Ohio, manufacturer of electrical equipment, parts, etc., has let contract for a one-story addition, 40 x 120 ft.

Max Robbins, president of **Max Robbins Metal Company, Inc.,** Indianapolis, Ind., has been elected vice-president and managing director of **Schmutz Metal Refining Company, Inc.,** Louisville, Ky. The Louisville plant will be operated as an associated company to Max Robbins Metal Company, Inc., Indianapolis,

Electric Air Heater Company, Division of **American Foundry Equipment Company,** 408 Byrkit Street, Mishawaka, Ind., will exhibit their complete line of electric air heaters in space No. 625 at the 4th International Heating, Ventilating and Air Conditioning Exposition. Among the products displayed will be the Electromode Heater of the Industrial type the Bilt-In Domestic type and the Portable unit, as well as the electro-heating grids or elements for other air conditioning work. H. A. Soverhill, manager of this Division, will be in attendance.

The Aluminum Company of America has started preparations for the resumption of operations at its plant in the Hydraulic Canal Basin, Niagara Falls, N. Y. This plant has been closed since July, 1931.

T. E. Conklin Brass and Copper Company, Inc., 54-60 Lafayette Street, New York, will move into its new offices on January 20, one floor above the warehouse. It is the 75th year of this company in the brass and copper business.

Ralph Leavenworth, for several years general advertising manager of Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has resigned, effective Dec. 31. On Jan. 1 he joined Fuller & Smith & Ross, Inc., Cleveland, Ohio.

Metallurgical Products Company, 1227 East Berks Street, Philadelphia, Pa., has purchased a new plant at 35th & Moore Streets, Philadelphia, which they will occupy some time in February. It consists of one 3-story building, two 2-story buildings, one 1-story building, a large warehouse and a power house. Land, 4½ acres; floor space, 40,000 sq. ft.; private 8-car siding. This company specializes in buying and refining nickel, its alloys and by-products; complex residues; unusual alloys; rare and semi-rare metals, drosses, oxides, sluges, slimes, minerals, etc.

The **Belke Manufacturing Company,** 947 N. Cicero Avenue, Chicago, Ill., has extended its plant and taken over the entire building, 125 ft. x 125 ft. at 4714 Walton Street, Chicago. In this plant new mixers and other equipment have been installed to handle the increased production required for buffing compositions. This building, taken over only 30 days ago, is now operating to capacity as is also the main plant. The Belke company has just been awarded a contract for the rubber plating of 100,000 aerials for the Galvin Manufacturing Company. They have also been awarded the contract for dish strainers and the rubber plating of various types of wire goods by the Washburn Manufacturing Company of Rockford. The company has opened a Detroit office at 1627 W. Fort Street, and extended its activities at its Cleveland office, 5005 Euclid Avenue.

Electric Auto Lite Company, Champlain and Mulberry Streets, Toledo, Ohio, has organized new subsidiary, Buckeye Bumpers, Inc., to take over plant of Central Brass and Fixture Company, Springfield, Ohio, for production of automobile bumpers, etc.

The **Baltimore Division** and the **Baltimore Tube Company Division of Revere Copper and Brass Incorporated** have been consolidated and hereafter will operate as the Baltimore Division. Sales offices are at 1301 Wicomico Street, Baltimore, Md., which is the address of the former Baltimore Tube Company. Branch offices of this division are located in Philadelphia, Atlanta, and New Orleans. **R. S. Stringer** is Vice-President of Revere's Baltimore Division and **R. H. Hodges,** Sales Manager.

John E. Sterling, who is well known throughout the plating fraternity because of his connections with the various Platers Organizations, having been Supreme President of the American Electro-Platers' Society, also its Supreme Secretary-Treasurer, and also having held office in the New York Branch for the past 15 years; has become associated with the Special Chemicals Corporation of 30 Irving Place, New York. Mr. Sterling will utilize his forty years of plating experience in the service and installation of their products, such as Spekwite, Rhodium, etc.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

January 2, 1936.

President Cornelius F. Kelley of the Anaconda Copper Mining Company and Vice-President James R. Hobbins visited the American Brass Company plants here, and in Ansonia and Torrington a few weeks ago. President John A. Coe of the American Brass Company and Treasurer Clifford L. Hollister accompanied them on their trip of inspection. The brass industry positively will not leave the Naugatuck valley, Mr. Kelley said. He declared that it is here to stay.

The Chase Companies, Inc. are carrying on negotiations leading to the purchase of the business of the American Electrical Works at Phillipsdale, R. I., according to officials of the local concern. If the deal goes through, Chase will go into the manufacture of copper wire as the Rhode Island company has a heavy volume of this business.

Although it is reported in Meriden that the American Brass Company is negotiating for the purchase of the Bradley & Hubbard Company of that city, officials of the local company deny it. The Meriden company manufactures high grade lighting fixtures. It is reported that its business has been poor lately and that it has been disposing of its stocks at retail to the general public whereas its regular trade is with wholesalers.

John A. Coe, president of the American Brass Company is now completely recovered following an operation for gallstones.

Benjamin Ozaroff, superintendent of the Benrus Manufacturing Company of this city was fined $100 and costs in the local court last month on charges brought by the state labor department of violating the labor laws. Mr. Ozaroff explained that the violations were due to the pre-Christmas rush. Following the disposition of the case Mr. Ozaroff invited the labor department officials to inspect the plant and they reported themselves as pleased with the set-up and working conditions.

Employment in this city for the month of November showed 32,471 persons at work compared with 29,057 a year ago. The gain over October of this year was 207. The present total is the best since December, 1929.

The Scovill Manufacturing Company has declared the regular quarterly dividend of 25 cents a share, payable Jan. 1 to stock of record Dec. 12. The Plume & Atwood Company has declared the usual dividend of 50 cents a share, payable Jan. 1 to stock of record Dec. 25.—W. R. B.

Connecticut Notes

January 2, 1936.

HARTFORD—Erwin S. Smith, the trial examiner at the recent hearing here, has reported to the national labor relations board that the Pratt & Whitney Company and Hamilton Standard Propeller Company of this city have engaged in "unfair labor practices through the discriminatory layoffs of 18 union members." The report orders that the men be reinstated with back pay. The layoffs followed a strike at the two plants in September. J. Carleton Ward, assistant general manager of the Pratt & Whitney Company announced the company would appeal from the finding.

The Royal Typewriter Company now has 4,500 employees, an increase of 2,000 in the last two years. Charles H. Cook, the vice president says. While wage rates are higher the wages are not as great because of the 40 hour week.

Sesamee Lock Company is moving from the Standard Screw Company plant to the Automatic Refrigerating Company building. The company is now under the control of Porter B. Chase, the president. William D. Holman is vice president and C. A. Post is secretary and treasurer.

NEW BRITAIN—Stanley Works declared an extra dividend of 25 cents a share and the regular dividend of 25 cents, payable Dec. 31 to stock of record Dec. 16. The company has also given its employees a bonus in the form of an extra week's pay.

The Skinner Chuck Company announces the resignation of R. B. Skinner as secretary, sales manager and director and the election of K. H. Walther as secretary and sales manager.

BRIDGEPORT — The Bridgeport Brass Corporation paid the regular quarterly dividend of 10 cents a share on Dec. 30.

The Byrant Electric Company plans the erection of an addition to cost $75,000. It will be 90 by 220 feet, one story high and contain 20,000 square feet.

The Casco Products Company plans a factory addition 90 by 180 feet.

ANSONIA—N. W. Pickering, president of the Farrel-Birmingham Company has been elected a vice president of the National Association of Manufacturers.

BRISTOL — The Wallace Barnes Company gave each of its 800 employees an extra day's pay as a Christmas present. Ernest Andrew, president and general manager, says this means that the company has restored the custom it was obliged to drop during the depression.

DeWitt Page, president of the New Departure Company, has given the city $50,000 for recreational buildings in Page park, which was also given by him to the city.

TORRINGTON — The Torrington Company directors have declared an extra dividend of 50 cents a share and the regular quarterly dividend of $1 a share, payable Jan. 2.

MERIDEN—Harry L. Dyson, formerly sales manager of the Miller Company, has been elected president of the Herco Art Company, succeeding Henry E. Rainaud, the founder of the concern.

STAMFORD — The Schick Dry Razor Company has acquired a factory site at St. John's, New Brunswick for British dominion trade—W. R. B.

Providence, R. I.

January 2, 1936.

Reference has been made repeatedly in industrial circles during the past few years to the scarcity of skilled workmen as one of the results of the industrial curtailment and economic conditions incidental to the prolonged depression. For several years special courses have been conducted in the Jewelry and Silversmithing Department of the Rhode Island School of Design. The City of Providence, in its public school system, has maintained a Jewelry Division in its Occupational School, and a similar school has been conducted at Attleboro.

But, notwithstanding these agencies, there has been a continual and noticeable diminution of expert laborers. Consequently the New England Manufacturing Jewelers' and Silversmiths' Association and the Metal Findings Manufacturers' Association, have taken steps toward the resumption of the apprenticeship system.

These organizations have named a committee to study the subject and to report a workable apprentice system for trade adoption. George W. Jenckes, manager of the D. M. Watkins Company, of Providence, will head the committee, which will consist of six members besides himself. They are: George Reuckert, president of the Reuckert Manufacturing Company, of Providence; Arnold Anderson, of the Evans Case Company, of North Attleboro; Leonard Lamb of the Simmons Chain Company, of Attleboro, and W. C. Hendrickson of the Uncas Manufacturing Company, of Providence, representing the New England Manufacturing Jewelers' and Silversmiths' Association and Frederick A. Ballou, of the B. A. Ballou Company, Inc., Providence, and Frank Farnham, president and treasurer of the Jewelers' Supply Company, of Providence, representing the Metal Findings Manufac-

turers' Association, of which they are both past presidents.

A number of corporations identified with the various metal industries of Rhode Island are included in the list, filed a few days ago with the Secretary of State by the State Board of Tax Commissioners, of corporations whose charter or articles of association have become forfeited for non-payment of franchise taxes. This list is prepared annually and any such corporation, or any stockholder, officer or agent thereof who shall continue to conduct the business under said charter is liable upon conviction, to a fine of from $50 to $1000 for each offense.

Abel Jewelry Company, Inc., 1931, Providence; **Acme Specialty Company**, 1931; Providence; **Allen & Allen Company**, 1925, Providence; **Art Metal Corporation**, 1928, Providence; **Atlas Sheet Metal Works, Inc.**, 1920, Providence; the **Bassett Jewelry Company**, 1930, Providence; **Beacon Pressed Steel Company**, 1923, Providence; **L. Brayton Foundry Company**, 1903, Warwick; **Ceco Radio Tube Company of Ohio**, 1930, Providence; **Claix Manufacturing Company, Inc.**, 1930, Providence; **Eureka Ring Company, Inc.**, 1928, Providence; **Flint-Blood Corporation**, 1926, Providence; **Gallo Propeller Company, Inc.**, 1931, Providence; **A. A. Greene Company, Inc.**, 1923, Providence; **Jewelers' Trading Corporation**, 1931, Providence; **The Jobbers Supply Company, Incorporated**, 1896, Providence.

Johnson & Company, Inc., 1829, Providence; **Kandarian Company Incorporated**, 1930, Providence; **Mike Kaplan Jewelry Company**, 1931, Providence; **Metropolitan Supply Company, Inc.**, 1930, Providence; **Modern Moulded Products Company, Inc.**, 1926, Providence; **Orkin Jewelry Company**, 1930, Providence or elsewhere; **Phonograph Needle Manufacturing Company**, 1926, Providence; **Princess Ring Company, Inc.**, 1929, Providence; **Ernest Quintin Bead Company**, 1929, Pawtucket; **Rec Manufacturing Company**, 1911, Providence; **Romanco Manufacturing Company**, 1930, Providence; **Saacke-Schmidt Company, Inc.**, 1930, Providence; **Simplex Tool Company**, 1917, Woonsocket; **Steere-White Company**, 1928, Providence; **Thornton Brothers Company**, 1906, Providence; **United Pencil Company**, 1930, Providence; **Universal Safety Ash Tray Company, Inc.**, 1920, Providence; **Wightman & Hough Company**, 1893, Providence.

Llewellyn W. Jones, treasurer of the **General Fire Extinguisher Company** and **Vincent M. Sorrentino**, president-treasurer of the **Uncas Manufacturing Company**, were elected directors for two years at the annual meeting of the **Providence Chamber of Commerce.**

The Armbrust Chain Company have practically doubled their capacities by taking over the entire fifth floor of the **Irons & Russell** building at 95 Chestnut Street. They now occupy the entire space on the fourth and fifth floors of the building and considerable new machinery and equipment has been installed.

The **L. G. Balfour Company** has acquired the two-story brick building at 26 North Main Street, Attleboro, which will be utilized in the expansion of the sales facilities of the concern as soon as necessary renovations and improvements are made. This is the sixth building that has been added to the company's plant within the last few years in order to meet the necessities of its growing business.

William P. Henrickson, who has been superintendent of the **Uncas Manufacturing Company**, of Providence, for the past sixteen years, has resigned to become the head of a new organization. **Mr. Henrickson** has been prominently identified with the manufacturing jewelry industry for a quarter of a century, serving on numerous committees of jewelers' associations.

The Supreme Novelty Company, at 12 Beverly Street, is owned by **Zane White**, according to his statement of ownership filed at the office of the City Clerk.

The Metacomet Manufacturing Company, of Providence, has been granted a charter under the laws of Rhode Island for the purpose of conducting a manufacturing jewelry business with an authorized capital of $25,000. The incorporators are: **Edward M. Brennan** and **George A. Johnson** of Providence, and **Richard F. Canning** of North Providence.—**W. H. M.**

Middle Atlantic States

Utica, N. Y.

January 2, 1936.

At Colgate University, **Dr. Sidney French**, assistant professor of chemistry and head of the Physical Science Survey of the University, is experimenting with gallium, the rare and expensive metal. He is being assisted by **Donald Saunders.** He is attempting to lower the melting point of the alloys that have exceedingly low melting points and such as Wood's metal and type metals. Doctor French in his experiments thus far has developed an alloy that has a melting point of about 16 degrees centigrade.

The second largest income for an eight-month period in the history of **Remington Rand Inc.** is reported by company officials at Ilion for the month ending Nov. 30. The amount is placed at $1,453,454, double the net for corresponding period in 1934 and exceeded only by the figure established in 1929. Unfilled orders have increased month by month for the past six months and showed the largest orders since the end of November in 1930. The largest increase has been in orders for the noiseless typewriters.

The public auction of the office equipment and machinery held in the Rome plant of the **Rome Products Inc.** netted approximately $18,000. The organization realized about $50,000 from the sale of the Manhattan branch equipment while a sum of $23,000 was reported as the total in the sale of the equipment in the Boston branch.—**E. K. B.**

Newark, N. J.

January 2, 1936.

Metal industries in and around Newark report little change in business conditions during the past month. Some report an increase in output and others a dropping off. The property of the **Barlow Foundry** on Rhome Street, comprising 25,000 square feet, has been leased to **Grammer, Dempsey & Hudson, Inc.**, which concern has begun operations. The company started operations with a capital stock of $100,000.

The **General Electric Company** has sold several buildings of its foundry plant at Elizabeth to a Western concern. The firm will move there after operations have been made. A few weeks ago some of the foundry plant was sold to the **New Jersey Metals Corporation.** The **Eastern Tool & Manufacturing Company**, Bloomfield, has leased a plant at that plant to handle its increased business.

Following Newark concerns have been incorporated: **Schwartz Products Company**, chemicals, 100 shares, no par; **Raymond L. Waters Company, Inc.**, jewelry, $10,000; **Allied Mercantile Company**, electrical appliances, $125,000.

—**C. A. L.**

Trenton, N. J.

January 2, 1936.

The **Skillman Hardware Manufacturing Company**, which was recently taken over by the **T. C. Wheaton Company**, Millville, N. J., reports that business has shown considerable improvement during the year. **E. F. Sutphen**, general manager, reports that many new orders have been received by the firm and that he expects the plant to be kept busy during the winter.

The **Edgely Brass Company**, Edgely, Pa., controlled by Trentonians, reports that business is improving and that it is showing a big gain over last year. The cable department of the **American Steel and Wire Company** is operating overtime while the **Crescent Insulated Wire & Cable Company**, is running at capacity.

Following concerns have been chartered here; **Peerless Color & Chemical Company**, Jersey City, $5,000; **C. G. Richat's Sons, Inc.**, manufacturing jewelry, Jersey City, $10,000; **Passaic Battery & Electric Company**, Passaic, $100,000; **Colorvision, Inc.**, radio equipment, Hasbrouck Heights, 1250 shares, no par.—**C. A. L.**

Middle Western States

Cleveland, Ohio

January 2, 1936.

Cleveland industrial plants are stepping out of the old year into the new at a production rate far in excess of what it was a year ago. The automotive industry took the lead in the early fall and is now under full headway on 1936 production schedules.

The accessory plants are said to have orders ahead that will keep them going until well along towards spring.

Industrial conditions are about the same in Toledo, and similar reports come from suburban industrial areas.

Col. Leonard P. Ayres, business statistician and vice-president of the **Cleveland Trust Company,** declares that 1935 has been "by far the best of the three recovery years of the depression" and predicts "modest progress" along the recovery trail for 1936.

Lincoln R. Scafe, president of the **Cleveland Branch** of the **Fisher Body Company** declares that "big business is on the spot." His company is meeting the challenge, he says, "by giving employees over 60 years old easier places and guaranteeing them 60 cents an hour for an average week of 35 to 40 hours. Mr. Scafe says that "the theory that men are not much use to industry after the age of 45 is not true. Out of 8,400 in our plant, some 1,500 are more than 45."—**F. J. H.**

Detroit, Mich.

January 2, 1936.

Manufacturers in all lines have come down to the end of the year feeling that life once more is really worth living. Production and sales during the last six months have been the best since 1930. Each month since New Year's has been one of progress. After a breath or two over the holidays it is apparent activities will resume with more vigor than ever.

The manufacture of refrigeration units continued its progress all through the past year. Probably more of them went out of Detroit and other Michigan plants than during any previous period. The new year probably will make a much higher record.

Jewelry manufacturers show a slight increase but this industry is having difficulty pulling itself out of the stagnation that has so long prevailed. However, better things seem to be in sight.

Platers always are busy when the automobile plants are busy. Many are now operating night shifts.

The **Larson Steel Products Corporation** has been formed at Buchanan, Mich., for the purpose of taking over the interests of **D. S. Larson Company,** which has carried on a chromium plating industry for two years. The new organization is headed by D. S. Larson and will include on its board of directors a number of South Bend, Ind., industrialists. It has an authorized capital stock of $125,000 of which $35,000 has been subscribed. The company will continue the plating business started by the Larson company, but will have as its main business the manufacture of steel forgings.

James H. Cooper, assistant to the president of the **McCord Radiator & Manufacturing Company,** has been appointed works manager of the company, succeeding the late **Frederick W. Hicks.**

Both Plymouth and Chrysler retail deliveries show steady increases during the last several weeks, sales being stimulated by the new 1936 models. The Chrysler production figures are way ahead of those for the corresponding period of a year ago.

The promotion of **H. F. Howard,** who has been manager of the assembly plant of the **Chevrolet Flint Division,** to the position of plant manager in charge of all operations at the company's new Baltimore, Md., plant, has been announced by **Arnold G. Lenz,** assistant manufacturing manager. The new plant in Baltimore has a capacity for assembling 80,000 units a year.

—**F. J. H.**

Pacific States

Los Angeles, Calif.

January 2, 1936.

The latest automobile company to establish a plant here, is the **General Motors Corporation** of Detroit, which concern has bought a tract of land at the extension of Santa Fe Avenue, factory to cost $2,500,000. They will employ 1500 hands and will have a production of 40,000 to 50,000 autos a year. This is a forty-six acre site. **Wesley L. Nutton, Jr.,** of the company was here to complete the deal. It is understood that later on the plant will be greatly enlarged.

The **Baked Enamel Corporation** is organizing here to build a large plant, to completely refinish thirty automobiles a day. The officers are **Paul M. Bellows, A. J. Farmer** and **William G. Grus.** The location is not decided on yet.

Aircraft Industries, at the Grand Central Air Terminal, Glendale, have organized to make a tiny, one-sixth h.p. air engine and monoplane. **Major C. C. Moseley** is president and **W. E. Atwood** in charge of production.

The **Domestic Manufacturing Company** will manufacture thermostatic valves at 700 East Florence Avenue.

A. Wertz will manufacture fruit spray equipment at 4334 San Fernando Road, Glendale.

A. Martinson will manufacture sheet metal goods at 2121 Belgrave Avenue, Huntington Park.

The **Le Pla Maxon Casket Company** will manufacture caskets, part metal, at 1212 East 63d Street.

The **Linde Air Products Company** is erecting an enlargement of its factory at 2305 East 52d Street.

The **Metlox Corporation** is doubling its capacity of their neon sign plant at 1200 Morningside Drive, Manhattan Beach.

The **Milo Harding Company** is enlarging their plant at 1135 South Los Angeles Street, to manufacture stencils and duplicating machines.

The **Seabright Pacific Company** will manufacture metal milk bottle caps.

The **Pathe Radio & Television Company** will move to larger quarters, at 1401 West 11th Street.

J. W. Miller, making radio parts, will start manufacturing a device to eliminate static, so as not to pick up noises from other sources, at 5917 South Main Street.

The **Hylite Corporation** at 255 West Santa Barbarba Street, have developed and will manufacture a new neon advertising sign, with flashing animated ideas, for a national distribution.

The **Safety Incinerator Company** at 3329 Sunset Boulevard, have started making a new metal incinerator.

The **Briting Radio Manufacturing Company** of 1126 High Point, are making a new short wave radio.

E. B. Dunn is developing television equipment and will soon be ready to manufacture the same.—**H. S.**

North Pacific

January 2, 1936.

The **Pelton Water Wheel Company** of 2929 19th Street, San Francisco, have been appointed Pacific Coast representative, for the **Chapman Valve Company** of Indian Orchard, Mass.

The **Ducommun Corporation** of 656 Townsend Street, San Francisco, is building a large warehouse, to handle all metal sheets, rods, wire, etc.

The **Navy Department** has built at the Puget Sound Navy Yard at Bremerton, Wash., the finest and largest machine shop of the kind in this country. There are 400 various types of machines, have built a large, new building, having 64 air heating systems and 22 smaller heaters, flood lights and all air conditioned. They have built a large electric shop and will work in all kinds of metals and alloy sheets.

The **Atlas Imperial Diesel Engine Company** is enlarging their factory at Oakland.

The **Ferro Enameling Company** of Oakland, has started a factory to make porcelain enamel for trucks, the whole body enameled, except door, roof, fenders and cowl. The enamel is heated to 1700 degrees, several coats sprayed on, over the sheet metal.—**H. S.**

Metal Market Review

January 2, 1936.

Copper rested for the whole of December at its high point for the year, 9.25 cents per pound for electrolytic. Trade during the first week was not very active but increased considerably during the second, sales amounting to over 19,500 tons against 9,000 tons. During the third week they dropped to 6,000 tons and at the end of the month they were a little more active although without change in price.

Zinc was also unchanged throughout, at 4.85c per pound for Prime Western. Sales during the first week amounted to less than 2,000 tons, rose to 5,000 tons the second week, slackened off considerably during the third and were inactive also during the fourth. The statistical position is excellent in the domestic market, however.

Cadmium, one of the leading by-products of zinc, continues to be extremely scarce, and interest in bright zinc plating to replace cadmium plating is growing.

Tin closed the year in rather dull fashion. Beginning December at 51.50c per pound for Straits and slipping steadily down to 48.375, closing at 48.60. Early in the month a small increase in the world's visible supply became evident. At a meeting of the International Tin Committee in the Hague, Holland, December 6th, tin production quotations were raised to 90 per cent of the standard tonnages from the present rate of 80 per cent.

Lead rested comfortably for the whole month of December, at 4.35c per pound, F.O.B. St. Louis. Buying during the first week was steady, amounting to 6,200 tons. It continued with 7,000 tons for the second week and 5,000 tons during the third, but quieted down during the fourth. The undertone of the market is decidedly firm.

Aluminum showed no change, remaining at 22.00c per pound. **Nickel** was also unmoved at 35.00c per pound for electrolytic.

Antimony was heavy. It spent the first two weeks at 14.75c per pound. Then it slipped to 14.50 and then again, in the last few days in the month, to 14.00.

Silver leaped back into the limelight accompanied by a resounding crash. For the first time in months, quotations changed from 65.375c per ounce where they had been nailed, and slid rapidly downhill, beginning December 9th, without interruption, closing, up a little, at 49.75. According to all information obtainable, the break was caused by the "temporary" withdrawal of the United States Treasury from the market. Indications were that the Administration stopped buying pending the full understanding of the recent move in China, which established a managed currency tied to the pound Sterling. Authentic information from the Treasury could not be obtained. The only statements made were that the change in policy was "in the public interest."

Scrap Metals were firm. Offerings at the beginning of the month to refiners were limited. They moved a little more freely during the second week and the third, but prices continued firm. At the end of the month offerings slowed again.

Large orders of brass ingots resulted in an advance of ¼ cents per pound on December 4th. The demand receded, partly due to seasonal fluctuation, but the price remained unchanged at the higher level. Aluminum ingot shipments were good until the latter part of the month when they also were affected by the holiday lull.

The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of November, 1935, amounted to a total of 5,944 tons.

Average prices per pound for Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending November 29th were:

80-10-10 (1½% Impurities)	10.611c
70% Metal	8.305c
81% Metal	8.648c
83% Metal	8.826c
85-5-5-5	9.124c
No. 1 Yellow Brass Ingot	7.395c

Wrought Metal Market

The brass mills have been unusually busy for this season of the year. Several of the important plants have announced that the shut-down over the holiday season would be very short. Opinions continue to be expressed, unofficially of course, that a good part of this business consists of material for export, directly or indirectly connected with war needs or preparations.

A large New York distributor reports that December was 24 per cent ahead of December, 1934 and about the same as November, 1935; an unusual record for this month, which is generally low. The prospects for the first quarter of 1936 are good.

Daily Metal Prices for December, 1935

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2	3	4	5	6	9	10	11	12	13	16	17
Copper c/lb. Duty 4 c/lb.												
Lake (del. Conn. Producers' Prices)	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375	9.375
Electrolytic (del. Conn. Producers' Prices)	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25	9.25
Casting (f.o.b. ref.)	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.												
Prime Western (for Brass Special add 0.05)	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	51.50	52.00	51.50	51.00	51.125	50.375	50.25	49.75	49.50	49.625	49.85	49.875
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.75	14.50	14.50
Silver c/oz. Troy, Duty Free	65.375	65.375	65.375	65.375	65.375	64.75	63.75	62.75	61.75	60.75	59.75	58.75
Platinum $/oz. Troy, Duty Free	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	18	19	20	23	24	25*	26	27	30	31	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.													
Lake (del. Conn. Producers' Prices)	9.375	9.375	9.375	9.375	9.375	...	9.375	9.375	9.375	9.375	9.375	9.375	9.375
Electrolytic (del. Conn. Producers' Prices)	9.25	9.25	9.25	9.25	9.25	...	9.25	9.25	9.25	9.25	9.25	9.25	9.25
Casting (f.o.b. ref.)	8.95	8.95	8.95	8.95	8.95	...	8.95	8.95	8.95	8.95	8.95	8.95	8.95
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	4.85	4.85	4.85	4.85	4.85	...	4.85	4.85	4.85	4.85	4.85	4.85	4.85
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	49.375	49.25	49.00	48.75	48.375	...	48.375	48.50	48.60	48.60	52.00	48.375	49.770
Lead (f.o.b. St. L.) c/lb. Duty 2⅛ c/lb.	4.35	4.35	4.35	4.35	4.35	...	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	...	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	...	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	14.50	14.50	14.50	14.50	14.50	...	14.50	14.00	14.00	14.00	14.75	14.00	14.536
Silver c/oz. Troy, Duty Free	55.75	53.75	51.75	50.75	49.75	...	49.75	49.75	49.75	49.75	65.375	49.75	58.420
Platinum $/oz. Troy, Duty Free	36.00	36.00	36.00	36.00	36.00	...	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	...	35.00	35.00	35.00	35.00	35.00	35.00	35.00

[1] U. S. Treasury price. * Holiday.

The Metal Markets in 1935

Most Metals and Their Consuming Industries Showed Decided Improvement

COPPER AND BRASS MANUFACTURE

By

BERTRAM B. CADDLE

Secretary, Copper & Brass Research Association

AFTER some hectic six years of depression American industry during 1935 started a gradual return to normalcy with the result that the copper and brass fabricating plants of this country enjoyed, from a sales viewpoint, a most successful year. Toward the close of the year many of the departments operated three eight hour shifts to fill orders. The fabricators increased employment and the outlook for an even better year during 1936 is most encouraging.

Under the protecting wing of the Blue Eagle the copper and brass industry was able to maintain more or less stable prices for its materials. Then came the Supreme Court decision that, for a time, had the effect in upsetting all basic American industry. But these industries were soon able to right themselves. Fear that had gripped most of the Nation was shaken off and hoarding ceased. This resulted in a general buying movement, which increased the production of most all commodities. The great army of unemployed began to dwindle as all forms of employment increased.

The automobile industry with a sale of more than 4,000,000 cars enjoyed a boom year in 1935. It was one of the leaders of recovery. This is one of the large consuming industries for materials made from copper and its alloys. It is estimated that some 200,000,000 pounds of copper and its alloys were used by the automobile industry.

New construction and rehabilitation were slow to get into their stride. But under the stimulus of Federal Housing Administration, which the Administration is exerting every effort to make a success, building gradually started climbing upward until during the last quarter of the year it became one of the larger consumers of raw materials. Here also is a large outlet for copper and its alloys. Perhaps more than 150,000,000 pounds were consumed in 1935, and that tonnage will undoubtedly be much larger during 1936 in view of the fact, as most experts believe, that there will be some 1,000,000 new homes built during the next three or four years. The uses of copper and its alloys by this industry are manifold, including roofing materials, pipe and tubing for water lines, electric wiring, hardware, lighting fixtures, insulation, hot water heaters, etc.

Mechanical refrigeration has become a large consumer of these metals. That industry during 1935 consumed more than 50,000,000 pounds.

Air conditioning is an infant industry that promises to grow out of its swaddling clothes within a comparatively short space of time. It also is a large consumer of copper and may some time in the near future use as large a tonnage as is now being used by mechanical refrigeration. Railroad trains, hotels, apartment houses, clubs, restaurants, steamships and homes are being air conditioned. During 1936 many of the new office buildings as well as many of the present ones will be air conditioned.

For the Christmas holidays the manufacturers of giftware articles made from copper and brass enjoyed the best season in their history. Most of these manufacturers operated their plants in three eight-hour shifts, in an effort to fill orders for the holiday trade.

The year 1936 should be a most successful year for the copper and brass industry and 1937 even more so.

TIN IN 1935

By

C. L. MANTELL

Consulting Engineer, New York

THE world's consumption of tin, according to the latest available figures of the International Tin Research and Development Council, for the twelve months ending October, 1935, amounted to 138,415 tons. This was the highest rate for the last four years. It compares favorably with the 1934 period in that a 20 per cent increase is shown.

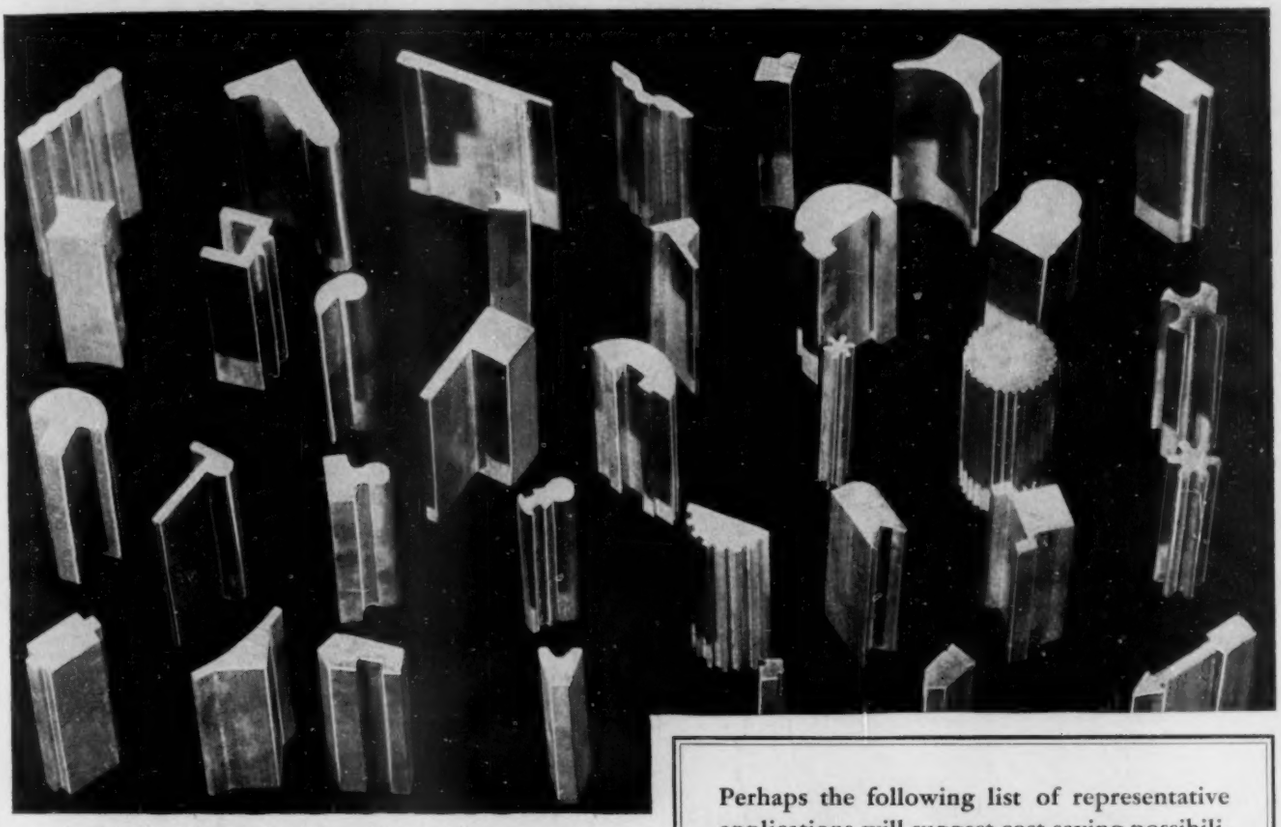
Improvement in consumption was general. Some of the smaller consumption countries, notably Italy, showed good gains. It is assumed that this increase is the result of military uses. The U. S. S. R. for the first time recorded a demand of over 7,000 tons. This figure was 35 per cent greater than for the corresponding period in 1934. American consumption showed an improvement of more than 40 per cent. There is every indication that industrial demand will maintain this consumption over the whole world. The present strong trend toward increased armaments and military equipment is expected to add further impetus toward increased production and consumption.

At the end of the year, quotas of tin producing countries were set at 90 per cent, a very much higher figure than previous years.

In the last week of December, the United Kingdom warehouse stocks were reported at only 814 tons. At the end of November, world visible stocks stood at 15,332 tons or approximately 11 per cent of the current annual rate of consumption.

34 Special Drawn Shapes

Each does a special job . . . most of them at a saving



Short lengths of Anaconda Special Drawn Shapes in full size cross-section.

THE Anaconda Special Drawn Shapes illustrated are typical of hundreds of drawn shapes produced by The American Brass Company. Each is designed to do a special job—better than the method or materials previously used—and usually for less cost.

Anaconda Special Drawn Shapes are available in long lengths—in copper, brass, bronze and nickel silver—and in cross-section to suit your exact needs.

We will welcome the opportunity of discussing the cost saving and design possibilities of Anaconda Special Shapes—drawn from either sheet or tube as well as rod and wire.

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- Banjo Fret Wire
- Pinion Wire
- Balance Wedge for Small Electric Motors
- Eyeglass Rim Channels
- Automobile Lock Parts
- Fancy Wire for Jewelry Chains
- Decorative Beading for Flat Silver Plated Ware
- Miniature Railroad Track
- Hinge Butt Strip
- Postage Meter Parts
- Clock Pinions
- Camera Parts
- Small Architectural Mouldings
- Handbag Hardware
- Motion Picture Projectors
- Special Hinges

THE AMERICAN BRASS COMPANY

General Offices: ANACONDA Waterbury, Connecticut

ANACONDA COPPER & BRASS

New consumption records were established in Italy, which took 5,370 tons for the twelve months ending October, 1935; Sweden, 1,953 tons; Poland, 900 tons; Egypt, 556 tons; Finland, 256 tons, and Greece 223 tons. The United States consumption over the same period was 59,967 tons as compared to 42,769 tons in 1934.

Tin prices in New York in cents per pound showed considerable variation, being 50.9 in January, 50 cents in February, almost 47 cents in March, 50.2 cents in April, 51.1 in May and June, 52.3 in July, 50.5 cents in August, 49.1 in September, 51.1 in October, 51.9 in November, and 48.8 in December. The average price over the year for 1934 in New York was 52.2 cents. Tin futures for Straits tin are quoted below the 48.8 cent figure of the end of the year.

There were no important new developments in tin consumption in the United States during 1935. Tin plating of cast iron automobile pistons suffered a set-back when a number of car manufacturers changed over to aluminum pistons, and treated these by an electrolytic oxidation process. The packaging of beer in tin cans gave a marked stimulus to increased consumption of tin plate in this field. The can companies, if judged by evidence of stock dividends and additional dividend payments as well as construction of new plants, were in general in a happy condition. Developments in powder metallurgy and the production of synthetic alloys in parts made by compression caused increased production and consumption of tin powder in various grades.

In general, 1935 for the tin industry was much rosier than previous years, and showed considerable promise.

ZINC

By

W. R. INGALLS

Director, American Bureau of Metal Statistics,

New York

THE history of zinc in the United States in 1935 is in many respects more brilliant than that of either copper or lead. The price for spelter rose from 3.70c to 4.85, which was proportionately more than for copper, or for lead; and that in itself tells most of the story. Production has been about 430,000 tons vs. 367,000 in 1934. Deliveries about 470,000 vs. 352,000. Consequently there was a reduction in stock in hands of smelters, which at the beginning of January was about 120,000 tons, and at the end of November about 86,000. At the same time the stock of zinc in ore in the Tri-state district in terms of recoverable zinc, increased only from 8,500 tons to 13,000.

This satisfactory development may be ascribed to two things; viz. (1) producers did not step up their production; and (2) there was substantial increase in consumption. The latter was associated with greatly increased demand for zinc for die casting, a noteworthy improvement in the demand for brass mill fabrications, and a decided improvement in the requirements by galvanizers. Both die casting and brass making were closely associated with automobile manufacture. The makers of automobiles had previously become committed to die cast zinc for body hardware. Their general adoption in 1935 of ornamental radiator grills had a powerful effect, which is expected to extend into 1936.

The real strength of spelter in the latter part of 1935 was not fully comprehended. Attention had been concentrated too much and too long on the magnitude of the stock existing in the hands of smelters. It was overlooked that this stock was to some extent the result of the conversion of concentrates into metal for the sake of safety, that the stocks of concentrates at mills, both in the Tri-state district and in the several districts west of the Rocky Mountains had been gradually reduced to insignificant proportions, and that stocks in the hands of brass makers, galvanizers, etc., had been allowed to run down; all of which is to say that the visible stock comprised nearly all there was, and even a magnitude of 100,000 tons would not be out of order.

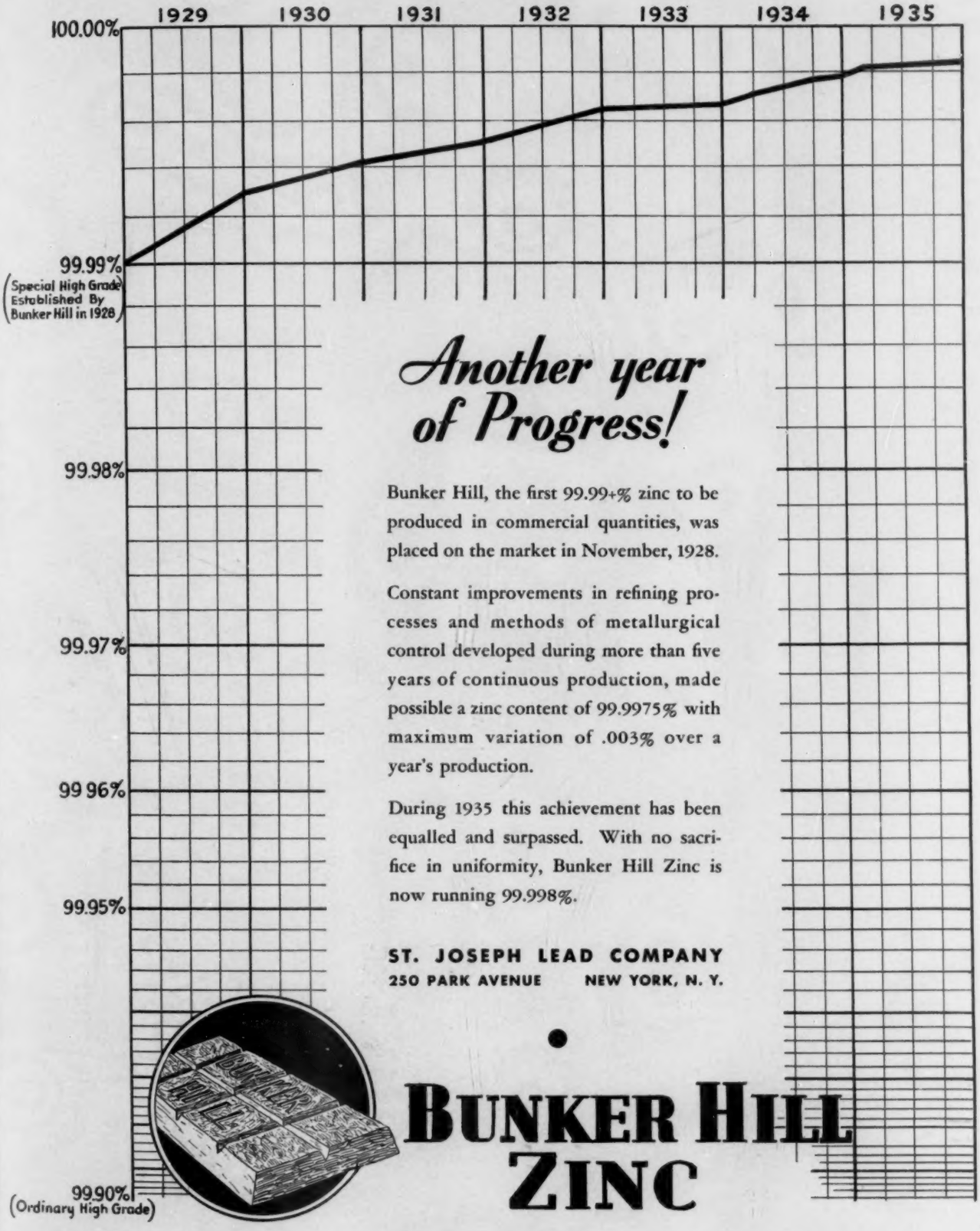
With an increasing rate of consumption the underlying consideration is of course what we are going to do for ore supply. Some of our major mines are waning and we are not developing new ones. The new vein in the Bunker Hill & Sullivan is about the only one of large tonnage that has been opened during the last five years. Even so, during 1935 in order to aliment the Silver King plant it became necessary to resume production from the Star mine. In general a fairly high price for zinc, something like 5c, is really necessary to bring out production from the Coeur d'Alene. Something like that is also required to increase production of the Tri-state district, where the accumulations of old tailings are dwindling.

Although the situation in spelter became so satisfactory in 1935, in some other respects the situation in zinc was not so happy. It is a fine thing to put so much zinc into die casting, but sooner or later zinc junk from those uses is bound to come back to us. Partly from this, and partly perhaps from other causes, there developed in 1935 a severe competition in zinc oxide, with a sharp reduction of price effective Oct. 1. We end the year on a five-cent basis.

Outside of the United States the commercial conditions were just the opposite of ours; for while here the price for spelter exceeded the price for lead, in Europe it was the other way around. Foreign production was kept well in hand. The year's total will be about 1,033,000 tons vs. 934,000 in 1934. Consumption increased substantially over that of 1934 and has averaged about 82,000 tons per month, plus such foreign spelter as we have used in this country for the manufacture of galvanized goods for export under the drawback privilege. Stocks of spelter ex U. S. A. are unknown, but probably the total has not changed much from what it was at the beginning of the year, when about 120,000 tons was reported.

Of the foreign spelter production in 1935 nearly 40% was high grade, principally electrolytic, but inclusive of some refined by fractional distillation. This supply was so bountiful that the premium was trimmed, and there is said to have been more or less deliberate debasing.

The foreign situation in spelter may have been under the shadow of coming events. Germany is determined to increase its production. With the beginning of 1935 the Magdebury plant came into full operation. During the year construction of a new plant was begun to produce 40,000 metric tons of spelter per annum from the Rammelsberg mine. Both of these plants bring in new ore supplies rather than displace the beneficiation of old ones. Mt. Isa began the production of zinc concentrates and shipments of zinc concentrates were resumed from Peru.



Another year of Progress!

Bunker Hill, the first 99.99+% zinc to be produced in commercial quantities, was placed on the market in November, 1928.

Constant improvements in refining processes and methods of metallurgical control developed during more than five years of continuous production, made possible a zinc content of 99.9975% with maximum variation of .003% over a year's production.

During 1935 this achievement has been equalled and surpassed. With no sacrifice in uniformity, Bunker Hill Zinc is now running 99.998%.

ST. JOSEPH LEAD COMPANY
250 PARK AVENUE NEW YORK, N. Y.

BUNKER HILL ZINC

NICKEL AND ITS NON-FERROUS ALLOYS

By

ROBERT C. STANLEY

President, The International Nickel Company of Canada, Limited, Copper Cliff, Ontario*

STATISTICS for the first ten months of 1935 indicate that the current year's business will be the largest in the history of the nickel industry.

World consumption of nickel in all forms during the first ten months amounted to 133,300,000 pounds. This compares with 112,481,600 pounds in the first ten months of the previous peak year, 1929, and with 102,780,000 and 77,600,000 pounds, respectively, in the similar periods of 1934 and 1933.

Analysis of world nickel consumption definitely shows that the great bulk of the metal continued to move directly into established peacetime uses. As a basic material, nickel has been among the first commodities to feel the impulse of returning industrial activity. In this connection it is significant that nickel is now employed in one form or another by major industries, and that there are in world markets more than 1,000 trademarked alloys containing nickel.

Several American technical societies recently announced that their tests have definitely demonstrated that substantial coatings of nickel are required to assure practical immunity from atmospheric corrosion. These findings, together with the results of investigations made in Great Britain and on the Continent, are already leading to the widespread adoption of more intelligent plating technique and heavier nickel coatings. This trend has been further stimulated by the development of a plater's microscope with which it is possible to measure accurately the thickness of electrically deposited metal. Formerly this value was arrived at through calculation and, because of variations in the thickness of the deposit, due to the contour of the plated material, it was not always accurate.

Probably the outstanding development in this field has been the perfection of the process for bright nickel plating. The main cost factor in electroplating has been the grinding and buffing of the article prior to plating and the final buffing thereafter. In this new process the initial buffing is simplified and the final treatment is eliminated. The deposit is laid down at a faster rate and the metal to which it is applied can be shaped without serious impairment of the finish.

Some rather startling reductions in final costs have already been effected by this process, and the indications are that it will be widely adopted not only in automotive production but also in the fields of builders' hardware, household equipment, etc.

The tonnage of nickel used as nickel anodes for electro-deposition during the first nine months of 1935 increased substantially over that for the corresponding period of 1934. Considerable work has been done to improve the quality of the rolled anode, and it now may be considered the most uniform and highest quality nickel anode on the market. This recent work has both improved the solubility of the anode and decreased the possibility of "rough work," a feature of special interest to the plater.

Among the non-ferrous alloys, Monel metal has further strengthened its traditional position by the development of the "K" and "S" series. "K" Monel now offers to the engineering and manufacturing industries a combination of physical properties, which opens up applications for a high strength corrosion resisting alloy. "S" Monel, with a silicon content higher than that of regular Monel metal, is being successfully cast as valve trim for steam lines in power plants and locomotives, as burner tips in oil refineries where the fuel is an acid sludge, as valve steam guides on radial air-cooled aeroplane motors, as valves and seats for soot blowers, and similar applications. It greater hardness and resistance to wear and to steam and other types of erosion, and its non-galling characteristic at high temperatures are the outstanding advantages of this new product.

Among the bronzes of the structural grades there has been a definite trend toward the use of nickel with tin to improve mechanical properties and to lower production costs. The practice is also expanding of making small nickel additions to high lead bronzes to prevent segregation, or "lead sweat," and to improve resistance to compression.

The attractive features of nickel-bearing aluminum alloys are gaining greater recognition, the principal applications today being pressure die castings, aircraft pistons, cylinder heads and automotive pistons. Such alloys have excellent casting qualities and good surface finish and machinability. A light aluminum alloy containing nickel has been developed recently by the Aluminum Company of America. The co-efficient of expansion of this alloy is less than that of unalloyed aluminum; consequently pistons made from it can be more closely fitted to cast iron cylinders. Since the co-efficient of this nickel aluminum alloy approximates that of Ni-Resist cast iron, these two types of alloys are often used together to advantage.

To the expanding interest in welding as a method for both structural work and fabrication of equipment, the nickel industry has contributed several improved materials. Welding clinics were held in various industrial centers to exhibit products fabricated by welding, to conduct group discussions of welding methods peculiar to each metal and alloy, and to give practical demonstrations of welding. Monel metal electric welding rod is now coated in a special extrusion machine, and "K" Monel has been electrically welded with excellent results through the use of a flux coated electrode. Continued improvement in flux coatings on all electric welding rod is giving better welding characteristics as well as physical properties.

* Abstracted from The Nickel Industry in 1935, released by the International Nickel Company.

GOLD AND SILVER

By

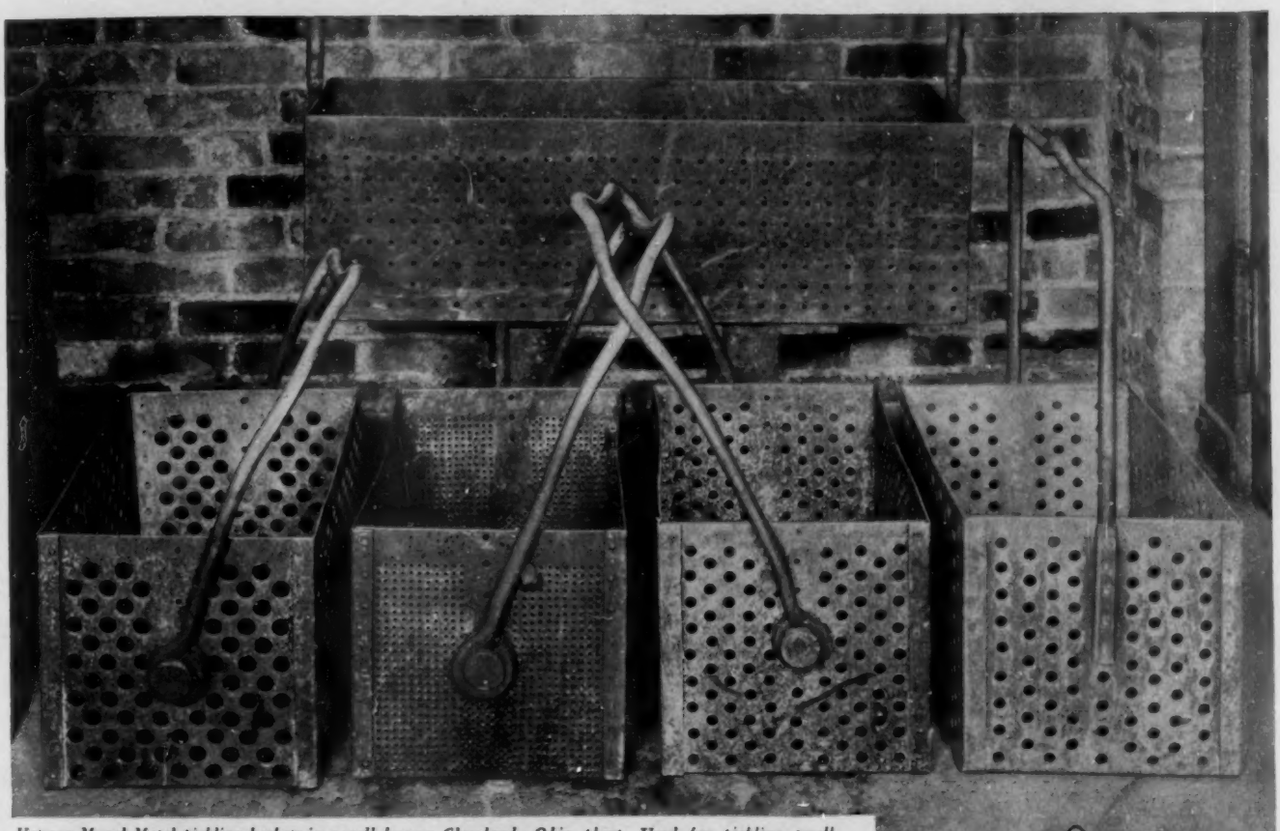
G. H. NIEMEYER,

Vice-Pres., Handy & Harman, New York

Gold

THE demand for gold for manufacturing purposes in 1935 increased materially above that in 1934. The increase was due principally to the greater demand for the more natural colors of gold—that is, green, red and particularly yellow—which more than offset the decline in use of the formerly

These Veteran Monel Metal Pickling Baskets are only 19 YEARS OLD!



Veteran Monel Metal pickling baskets in a well known Cleveland, Ohio plant. Used for pickling small stampings, forgings and chaplets previous to galvanizing or tinning. Some of these baskets have been in daily service since 1916!

WHAT A RECORD! 19 years of grueling pickling service...nearly two decades of daily immersion in hot sulphuric and cold muriatic acid...yet these veteran pickling baskets are still doing their stuff without a sign of quitting. What a record!

If that kind of performance isn't proof that Monel Metal is the best available material for pickling equipment—what is? Name another metal you've ever tried which could show such remarkable corrosion and wear resistance as these Monel Metal baskets. Think of the money this equipment has saved the user on repairs and replacements alone!

And that isn't all. Monel Metal's greater resistance to pickling solutions spells cleaner galvanizing or enameling surfaces. It gives the solution a chance to do its best work, and thus cheats the hungry scrap pile.

This is only one of many cases where Monel Metal equipment is helping metal processors reduce pickling costs and turn out better enamel ware. Doubtless some of these will interest you particularly...and we will gladly tell you about them. For details, concerning various applications of Monel Metal in pickling equipment, write for a copy of our new booklet: *"Equipment Designs for the Pickle House."*

Monel Metal

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N.Y.

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

popular white gold. Gold filled and rolled gold plate jewelry has found a more ready market, and so has gold electroplate. There was a substantial increase in the production of gold watch cases, but aside from a few novelties and class rings, the consumption of gold in karat gold jewelry showed a relatively small increase over 1934.

The price of gold for manufacturing purposes has pretty well stabilized around the Government price of $35.00 per troy oz. The supply has been adequate for use in the Arts. A good part of requirements has been met with the refined contents of old gold jewelry sold by the public. While the supply from this source gradually declined during the year, a considerable quantity still finds its way into the arts and industry channel.

The higher price of gold has naturally brought about many attempts to trade upon the quality marks established by law. Quite a number of convictions have been obtained under the Federal statutes. In addition, the Federal Trade Commission has issued a number of "Cease and Desist" orders which have had a very stabilizing influence upon the trade.

The National Stamping Law covers the manufacture of articles made of gold. Commercial Standards CS-47-34 covers the marking of gold filled and rolled plate articles and the absence of regulations covering the marking of articles made of gold and silver in combination was remedied by the adoption in June, 1935 of Commercial Standard CS-51-35.

Silver

Production—From figures available at this time, we estimate the world's production of silver during 1935 to have been 206,500,000 ozs., an increase of approximately 25,000,000 ozs. over 1934. The United States produced about 38,400,000 ozs. as compared with 25,500,000 ozs. in '34; Mexico about 72,200,000 ozs. as compared with 75,000,000 ozs. the year before; Canada 16,400,000 ozs., which is about what it was the previous year.

Consumption — We estimate that about 23,500,000 ozs. of silver were used by the Arts and Industries during 1935 in the United States and Canada, about 1,500,000 ozs. less than in 1934. The use of silver in the manufacture of sterling silver wares decreased about 15% below 1934. Silver plated ware showed an increase of about 5% and so did the demand for use in chemicals and motion picture film. The amount used for dental purposes remained practically unchanged, while that in the jewelry field increased about 10% over 1934.

New uses for silver in industry including the electrical field accounted for some increase in consumption during 1935 and will undoubtedly result in increased use as business continues to improve.

The silver market had a relatively wide range of price during 1935, reaching a high New York Official price of 81c on April 26th and a low of 49¾c on Dec. 24th, which was the price at the end of the year. The average price for the year was .64273c.

Buying by the United States Treasury Department in carrying out the provisions of the Silver Purchase Act of 1934 dominated the silver market throughout the year, the price level moving up and down with the price paid for silver by our Government.

The most significant and far reaching effect of our Government's buying policy and the resulting higher silver price has been the abandonment of the silver standard by China and Hong Kong and the steps taken by other countries to prevent the disappearance of their currencies either by debasement or substitution of paper notes.

The ultimate influence of our Government's policy under the Silver Purchase Act upon the future of silver will depend largely upon the revival of the buying of silver by China and other countries and a continued buying interest on the part of India. The price level at which the economic law of supply and demand will operate remains to be determined. There is, of course, no question as to the ultimate return to these fundamental laws, as our Government cannot be expected to indefinitely absorb all of the silver produced in excess of the industrial and limited coinage demand, in addition to the vast quantities of silver which the higher price may force upon the market.

World production this year, as previously stated, was about 206,500,000 ozs. Industrial demand is not in excess of 60 million ounces. While the eight nations' pact on silver agreed upon at the London Conference in 1933 will partially take care of the situation, what will happen after 1937 when the agreement expires? Even though a lower price would curtail production to some extent there would be about 100,000,000 ozs. of new silver a year to be disposed of after the silver used for coinage, Industry and the Arts had been provided for.

THE PLATINUM GROUP

By

CHARLES ENGELHARD

President, Baker & Company, Inc.,
Newark, N. J.

THE use of platinum metals during 1935 has been more widespread and has resulted in a more active year and stronger market conditions.

With returning prosperity, jewelry is getting on its feet again, and larger platinum and palladium sales are reported.

Both the platinum and palladium prices strengthened considerably, but remained, nevertheless, attractive, as compared with gold. This was particularly noticeable in the industries, because eventually both platinum as well as palladium should be as safe an investment as gold, inasmuch as an increased and steady demand should make for steady prices within the range of gold.

I make special mention of the great possibilities of palladium as an attractive replacer of gold in the industries, on account of its lower price and lower specific gravity. Palladium deserves far greater attention than it so far has received, because it is a natural white gold.

The employment of rhodium for plating purposes, has proved an outstanding success, and its possibilities for expansion are tremendous, limited only by the production of rhodium itself.

The consumption of iridium increased, and the price strengthened.

As a matter of fact, the market for platinum metals looks with confidence towards a satisfactory 1936.

The employment of these metals in the Arts and Industries offers excellent prospects for good profits during the coming year.

PLATINUM

AND THE OTHER PRECIOUS METALS IN INDUSTRY

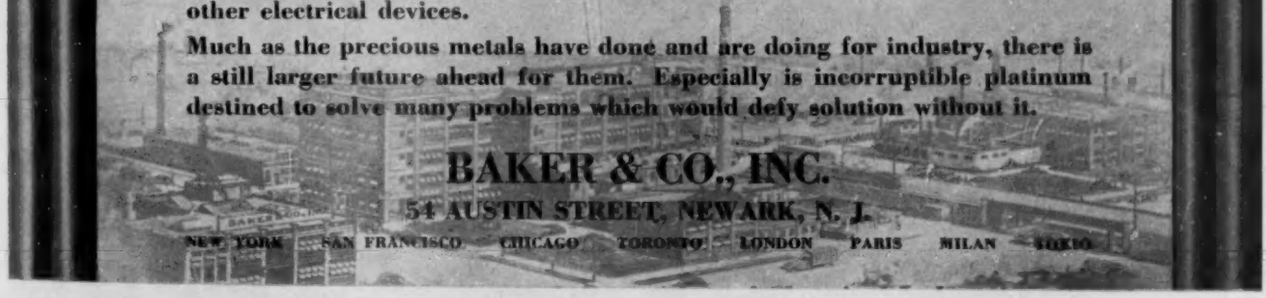
THE extent to which platinum and its allied metals as well as gold and silver are used in the chemical and other industries is often overlooked. As the largest organization in the world devoted to their refining and working, we are constantly aiding in the solution of industrial problems by means of the precious metals and seeking new uses for them.

Platinum may well be called a key-metal in industry. There is no other like it and no adequate substitute for it. Without it, the chemist's usefulness would be much curtailed. It withstands the action of acids and high temperatures to an unequalled degree. Great quantities are in use as catalysts in that modern miracle, the extraction of nitrogen from the air. We perfected an alloy of platinum and rhodium which appreciably increased the efficiency of platinum gauze catalysts and are now engaged in intensive research on improved platinum masses for making sulphuric acid. The name Baker on platinum laboratory ware is recognized universally as the mark of purity of metal and the best in workmanship.

The rayon industry is dependent upon an alloy of platinum and gold for its spinnerettes—those cup-shaped instruments pierced with tiny holes, through which cellulose solution becomes first silky rayon filaments and finally is woven into those lustrous fabrics so dear to the feminine heart. It was in our laboratories that plating with rhodium (one of the platinum metals) was made commercially possible. Today, literally hundreds of diverse articles are plated with this tarnish-proof metal. The housewife blesses it, for she never needs to polish her rhodium-protected silverware. The bride of today prefers to have a wedding ring of platinum placed upon her finger. By far the great majority of these rings are made from blanks supplied to the manufacturer by us.

Perhaps few know that athletic trophies and a complete coffee-set of platinum have been made; that palladium foil is coming into use for building decoration and for sign lettering; that this foil is in use for decorating fine books and has been applied to kid for dainty slippers and vanity cases. The amount of palladium employed in dentistry is very great. An alloy of palladium, rhodium and ruthenium is used by the jewelry industry for mounting stones and for decorating the new yellow gold jewelry. Many million silver contact points do their unobstrusive duty in fire-alarms and a host of other electrical devices.

Much as the precious metals have done and are doing for industry, there is a still larger future ahead for them. Especially is incorruptible platinum destined to solve many problems which would defy solution without it.



BAKER & CO., INC.

54 AUSTIN STREET, NEWARK, N. J.

NEW YORK SAN FRANCISCO CHICAGO TORONTO LONDON PARIS MILAN TOKIO

Metal Prices, January 7, 1936

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.375, Electrolytic, 9.25, Casting, 8.95.
Zinc: Prime Western, 4.85. Brass Special, 4.95.
Tin: Straits 47.00. Pig 99%, 45.875.
Lead: 4.35. **Aluminum,** 22.00 **Antimony,** 13.75.
Nickel: Shot, 36. Elec., 35.

Quicksilver: Flasks, 75 lbs., $78.00. **Bismuth,** $1.00.
Cadmium, $1.05. **Silver,** Troy oz., official price, N. Y., January 9, 49.75. **Gold:** Oz. Troy, Official U. S. Treasury price, January 9, $35.00. **Scrap Gold,** 6¾c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $36.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U S. Import Duty	Tax*
No. 1 Yellow Brass	7.75	None	4c. lb.[1]
85-5-5-5	9.50	None	4c. lb.[1]
88-10-2	12.50	None	4c. lb.[1]
80-10-10	11.00	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	9.75	None	4c. lb.[1]
Aluminum Bronze	13.75	None	4c. lb.[2]
Monel Metal Shot or Block	28	25% a.v.	None
Nickel Silver (12% Ni)	11.50	20% a.v.	4c. lb.[1]
Nickel Silver (15% Ni)	15.00	20% a.v.	4c. lb.[1]
No. 12 Aluminum	16.50-20	4c. lb.	None
Manganese Copper, Grade A (30%)	18-23	25% a.v.	3c. lb.[1]
Phosphor Copper, 10%	11.25-14	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	13.25-15	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	18.30	45% a.v.	4c. lb.[1]
Phosphor Tin, no guarantee	61-75	None	None
Iridium Platinum, 5%	$37-38.50	None	None
Iridium Platinum, 10%	$38-39.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 600 (7) of Revenue Act of 1932
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6¾ to 7	Free	4c. per pound on copper content
Light copper	6 to 6¼	Free	
Heavy yellow brass	4¼	Free	
Light brass	3.50 to 3.75	Free	
No. 1 composition	6	Free	
Composition turnings	5⅞	Free	
Heavy soft lead	3⅝ to 3¾	2⅛c.lb.	None.
Old zinc	2.85 to 3.00	1½c.lb.	
New zinc clips	3.85	1½c.lb.	
Aluminum clips (new, soft)	14 to 14.25	4c.lb.	
Scrap aluminum, cast	12 to 12.25	4c.lb.	
Aluminum borings—turnings	6¼ to 6½	4c.lb.	
No. 1 pewter	30.50 to 31.50	Free	
Electrotype	3.75 to 4	2⅛c.lb.*	
Nickel anodes	29½ to 31	10%	
Nickel clips, new	32 to 33	10%	
Monel scrap	12 to 18	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since October 9, 1935. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16¼c.	2½c. lb.
Bare wire, soft, less than carloads	13 c.	25% a. v.
Seamless tubing	16¾c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23⅞c.	10% Quality	26¾c.
15% Quality	26 c.	15% Quality	31⅛c.
18% Quality	27¼c.	18% Quality	34⅜c.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	14⅝c.	15½c.	16⅜	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	15⅛c.	16 c.	16⅞	25%	
Rod	13⅛c.	16 c.	16¾	4c. lb.	
Angles, channels	22⅝c.	23¾c.	24⅜	12c. lb.	
Seamless tubing	16⅝c.	17¼c.	18⅛	8c. lb.	
Open seam tubing	22⅝c.	23¾c.	24⅜	20% a.v.	

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound.	(Duty 4c. lb.; import tax 4c. lb. on copper content.)
Tobin Bronze Rod	16¾c.
Muntz or Yellow Rectangular and other sheathing	17⅞c.
Muntz or Yellow Metal Rod	14¼c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb. 32.80
Aluminum coils, 24 ga., base price, ton lots, per lb. 30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	53c.
Hot Rolled Rods	44c.	Standard Sheet	48c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	34	Standard Sheets (base)	38
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	43

SILVER SHEET

Rolled sterling silver (January 9) 51½c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb
Full Lead Sheet (base price)	8.00	2½c. lb.
Cut Lead Sheet (base price)	8.25	2½c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 47.

Pig Iron and Metal Production of the United States

Calendar Years 1926-1934. (1935 Estimated)

(FIGURES THROUGH 1934 FROM THE UNITED STATES BUREAU OF MINES)

PRODUCTS METALLIC	1926 Quantity	1926 Value	1927 Quantity	1927 Value	1928 Quantity	1928 Value	Products
Pig iron (spot value), long tons	38,181,053	$749,633,468	34,866,644	$646,226,139	38,303,699	$661,351,270	Pig iron
Copper, sales value, pounds	1,739,622,094	243,547,000	1,684,040,983	220,609,000	1,825,900,393	262,930,000	Copper
Zinc, sales value, short tons	611,991	91,799,000	576,960	73,851,000	591,525	72,166,000	Zinc
Tin, short tons	8	10,400	27	34,600	47	47,400	Tin
Lead (ref.) sales value, short tons	680,685	108,910,000	668,320	84,208,000	626,202	72,639,000	Lead
Aluminum, pounds	145,000,000	37,583,000	160,000,000	39,266,000	210,000,000	47,899,000	Aluminum
Nickel, value at New York, short tons	323	234,558	860	390,740	522	291,836	Nickel
Quicksilver, value at N. Y., flasks (e)	7,642	702,323	11,276	1,314,782	17,870	2,207,003	Quicksilver
Silver, commercial value, troy ounces.	62,718,746	39,136,497	60,434,441	34,266,328	58,462,507	34,200,567	Silver
Gold, coining value, troy ounces	2,335,042	48,269,600	2,197,125	45,418,600	2,233,251	46,165,400	Gold
Platinum and allied metals, value at New York City, in troy ounces	84,981	9,210,669	46,050	3,780,216	59,039	4,692,786	Platinum
Total value of metallic products (approximate) (b)		$1,402,920,000		$1,217,000,000		$1,284,580,000	

PRODUCTS METALLIC	1929 Quantity	1929 Value	1930 Quantity	1930 Value	1931 Quantity	1931 Value	Products
Pig iron (spot value), long tons	41,549,161	$731,858,075	29,905,355	$512,165,131	17,812,579	$285,147,156	Pig iron
Copper, sales value, pounds	2,002,863,135	352,504,000	1,394,389,327	181,271,000	1,042,711,178	94,887,000	Copper
Zinc, sales value, short tons	612,136	80,802,000	489,361	46,979,000	291,996	22,192,000	Zinc
Tin, short tons	39	35,600	17	10,500	4.1	2,050	Tin
Lead (ref.) sales value, short tons	672,498	84,735,000	573,740	57,374,000	390,260	28,879,000	Lead
Aluminum, pounds	225,000,000	51,864,000	229,035,000	50,961,000	177,544,000	37,284,000	Aluminum
Nickel, value at New York, short tons	340	297,273	308	213,803	373	202,406	Nickel
Quicksilver, value at N. Y., flasks (e)	23,682	2,892,638	21,533	2,478,789	24,947	2,179,145	Quicksilver
Silver, commercial value, troy ounces.	61,327,868	32,687,754	50,748,127	19,538,029	30,932,050	8,970,294	Silver
Gold, coining value, troy ounces	2,208,386	45,651,400	2,285,603	47,247,600	2,395,878	49,527,200	Gold
Platinum and allied metals, value at New York City, in troy ounces	47,977	3,121,471	43,502	2,048,824	36,205	1,274,029	Platinum
Total value of metallic products (approximate) (b)		$1,475,990,000		$982,550,000		$567,200,000	

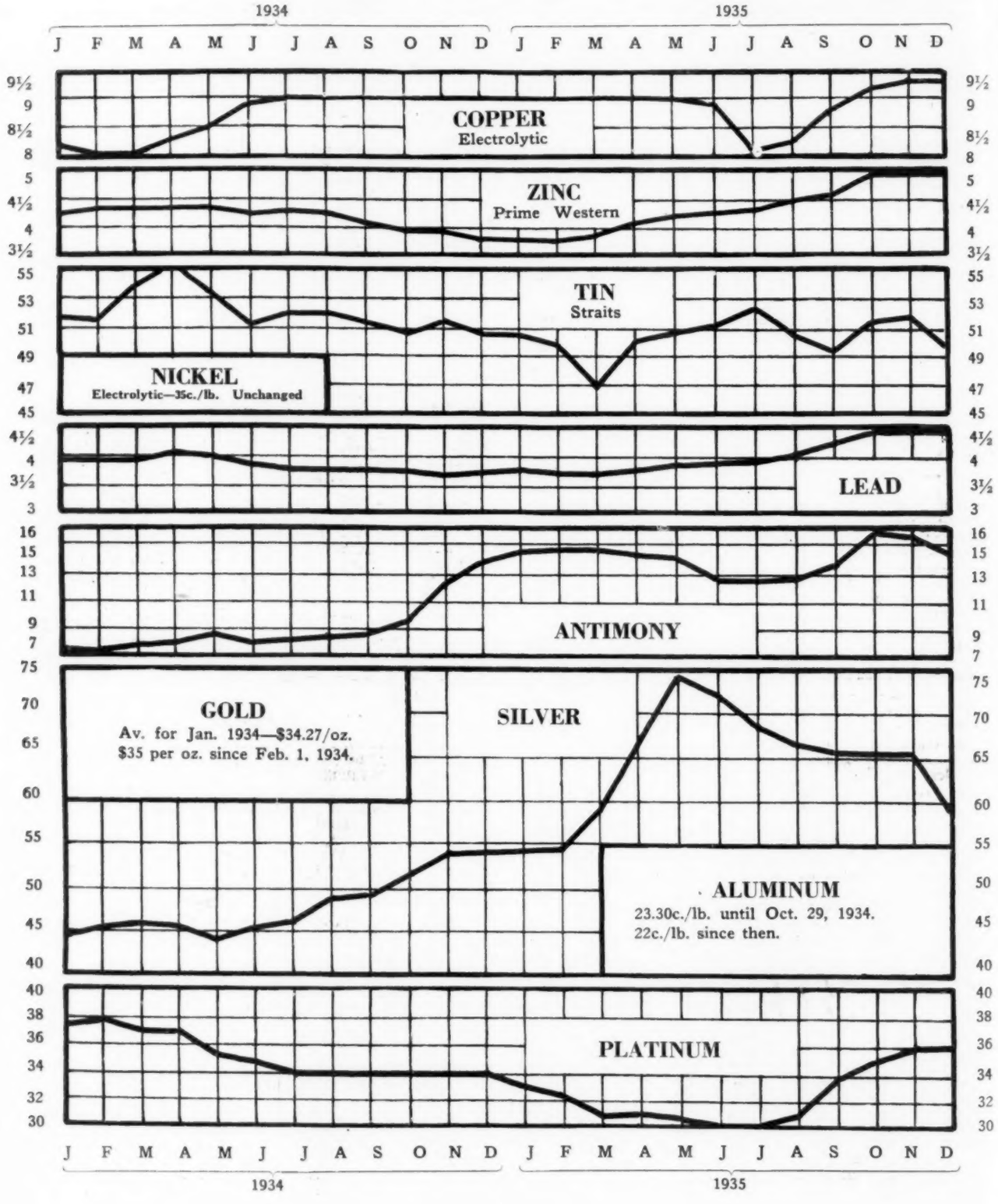
PRODUCTS METALLIC	1932 Quantity	1932 Value	1933 Quantity	1933 Value	1934 Quantity	1934 Value	Products
Pig iron (spot value), long tons	8,518,400	$126,032,714	14,353,197	$213,347,583	15,632,619	$264,653,746	Pig iron
Copper, sales value, pounds	544,009,948	34,273,000	449,999,143	28,800,000	488,454,107	39,076,000	Copper
Zinc, sales value, short tons	207,148	12,429,000	306,010	25,705,000	355,366	30,561,000	Zinc
Tin, short tons	0.5	220	3.0	2,400	9.2	9,600	Tin
Lead (ref.) sales value, short tons	255,337	15,320,000	259,616	19,212,000	299,841	22,188,000	Lead
Aluminum, pounds	104,885,000	20,453,000	85,126,000	16,174,000	74,177,000	14,094,000	Aluminum
Nickel, value at New York, short tons	195	88,515	126	62,913	157	108,414	Nickel
Quicksilver, value at N. Y., flasks (e)	12,622	731,129	9,669	572,666	15,445	1,140,845	Quicksilver
Silver, commercial value, troy ounces.	23,980,773	6,762,578	23,002,629	8,050,920§	32,725,353	21,155,784*	Silver
Gold, coining value, troy ounces	2,449,032	50,626,000	2,556,246	52,842,300‡	3,091,183	108,191,400**	Gold
Platinum and allied metals, value at New York City, in troy ounces	17,616	592,000	51,539	1,631,000	47,274	1,686,000	Platinum
Total value of metallic products (approximate) (b)		$283,700,000		$411,300,000		$542,100,000	

ESTIMATES OF UNITED STATES PRODUCTION FOR 1935

	Quantity	Value Total	Value Per Unit[1]
Pig iron (spot value) long tons (Iron Age)	21,100,000	$378,630,000	$18.03
Copper, pounds	726,000,000	62,791,740	8.649c
Zinc, pounds	856,000,000	37,047,680	4.328c
Tin (U. S. deliveries) pounds	140,500,000	70,840,100	50.420c
Lead (pig), sales value, pounds	625,000,000	25,525,800	3.915c
Aluminum, short tons	*	*	*
Silver, troy ounces, at N. Y. official price average	38,500,000	24,745,205	64.273c
Gold, troy ounces	3,600,000	126,000,000	$35

(a) Composite average; used as basis of total output value also.
(b) Includes some items of minor interest to metal trades not shown in table. (c) Del. Conn. Valley. (d) E. St. Louis.
(e) For years 1920 to 1927, inclusive, mercury reported by the Bureau of Mines in flasks of 75 pounds; for 1928 and succeeding years, in flasks of 76 pounds.
(f) No longer calculated separately. (g) Spot Straits average.
* At 65 + cents per fine oz.
** At $35 per fine oz.
§Average value 35c. per oz.
‡At $20.67 per ounce. Average weighted value for 1933 was $26.56 per oz.
[1] From Engineering & Mining Journal.

Chart of Metal Prices for 1934-1935



Prices shown at left and right of chart are in cents per pound, except for silver which is in cents per troy ounce and platinum which is in dollars per troy ounce.

Supply Prices—Page 47

Supply Prices, January 7, 1936

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper:	Cast	16¼c. per lb.
	Electrolytic, full size, 14¼c. cut to size	14¼c. per lb.
	Rolled oval, straight, 14¾c.; curved,	15¾c. per lb.
Brass:	Cast	14¾c. per lb.
Zinc:	Cast	9⅜c. per lb.
Nickel:	90-92%	.45 per lb.
	95-97%	.46 per lb.
	99%+cast, 47c.; rolled, depolarized, 48.	

Silver: Rolled silver anodes .999 fine were quoted January 9, from 53c. per Troy ounce upward, depending on quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3,	$4.75
1½ to 4	"	5.55	" 5.40	"	5.35
1 to ½	"	5.85	" 5.70	"	5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$76.30
14" 20 ply 84/92 Unbleached	58.51
12" 20 ply 84/92 Unbleached	44.01
16" 20 ply 80/92 Unbleached	63.81
14" 20 ply 80/92 Unbleached	49.02
12" 20 ply 80/92 Unbleached	36.96
16" 20 ply 64/68 Unbleached	56.32
14" 20 ply 64/68 Unbleached	43.32
12" 20 ply 64/68 Unbleached	32.72
⅜" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.13½-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.16¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.12½-.13½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¾-.04
Powdered, barrels	lb.	.0390-.0415
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	.85
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08½
Potassium—Bichromate, casks (crystals)	lb.	.09
Carbonate, 96-98%	lb.	.07½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.46¼
Cyanide, 100 oz. lots	oz.	.48-.55
Nitrate, 100 ounce lots	oz.	.39½
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15-3.30
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.0350
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.32½-.35½
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
*Tin Chloride, 100 lb. kegs	lb.	.37½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.66
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.38
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.028-.037

*Subject to fluctuations in metal prices.

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(Advertisers are entitled to one listing for each sixteenth page of space)

To Locate Advertisements of Firms Listed Below Refer to Alphabetical Index Page 47*

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Hanson-Van Winkle-Munning Co., Matawan, N. J.

Emery

Hanson-Van Winkle-Munning Co., Matawan, N. J.
Harrison & Co., Haverhill, Mass.
Stevens, Inc., Frederic, B., Detroit, Mich.

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Belke Mfg. Co., Chicago, Ill.

ACID PROOF PIPE

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General Ceramics Co., New York.
The B. F. Goodrich Rubber Co., Akron, Ohio.
U. S. Stoneware Co., New York.

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Thwing-Albert Instrument Co., Phila., Pa.

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McGean Chemical Co., The, Cleveland, Ohio.

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Grasselli Chemical Co., The, Cleveland, Ohio.
Harshaw Chemical Co., The, Cleveland, Ohio.
Hanson-Van Winkle-Munning Co., Matawan, N. J.
McGean Chemical Co., The, Cleveland, Ohio.

Hydrofluoric

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Harshaw Chemical Co., The, Cleveland, Ohio.

Oil of Vitriol (Sulphuric)

Zapon Co., The, New York, N. Y.

AEROPLANE DOPE

Egyptian Lacquer Mfg. Co., New York.
Zapon Co., The, New York, N. Y.

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ALLOYS (See also Kind Wated.)

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Brass, Bronze, Nickel, Silver

Seymour Mfg. Co., Seymour, Conn.

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Strahs Aluminum Co., New York.

ALUMINUM CLEANER

Magnus Chemical Co., Garwood, N. J.

ALUMINUM INGOT

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Maas & Waldstein Co., Newark, N. J.
Zapon Co., The, New York, N. Y.

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Tin

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Hanson-Van Winkle-Munning Co., Matawan, N. J.

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Felt

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